Fourth Five-Year Review Report

For

Outboard Marine Corporation Superfund Site

Waukegan

Lake County, Illinois

Prepared by

U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

June 2012

Approved by: Date:

Richard C. Karl, Director
Superfund Division
U.S. Environmental Protection Agency

6-28-12

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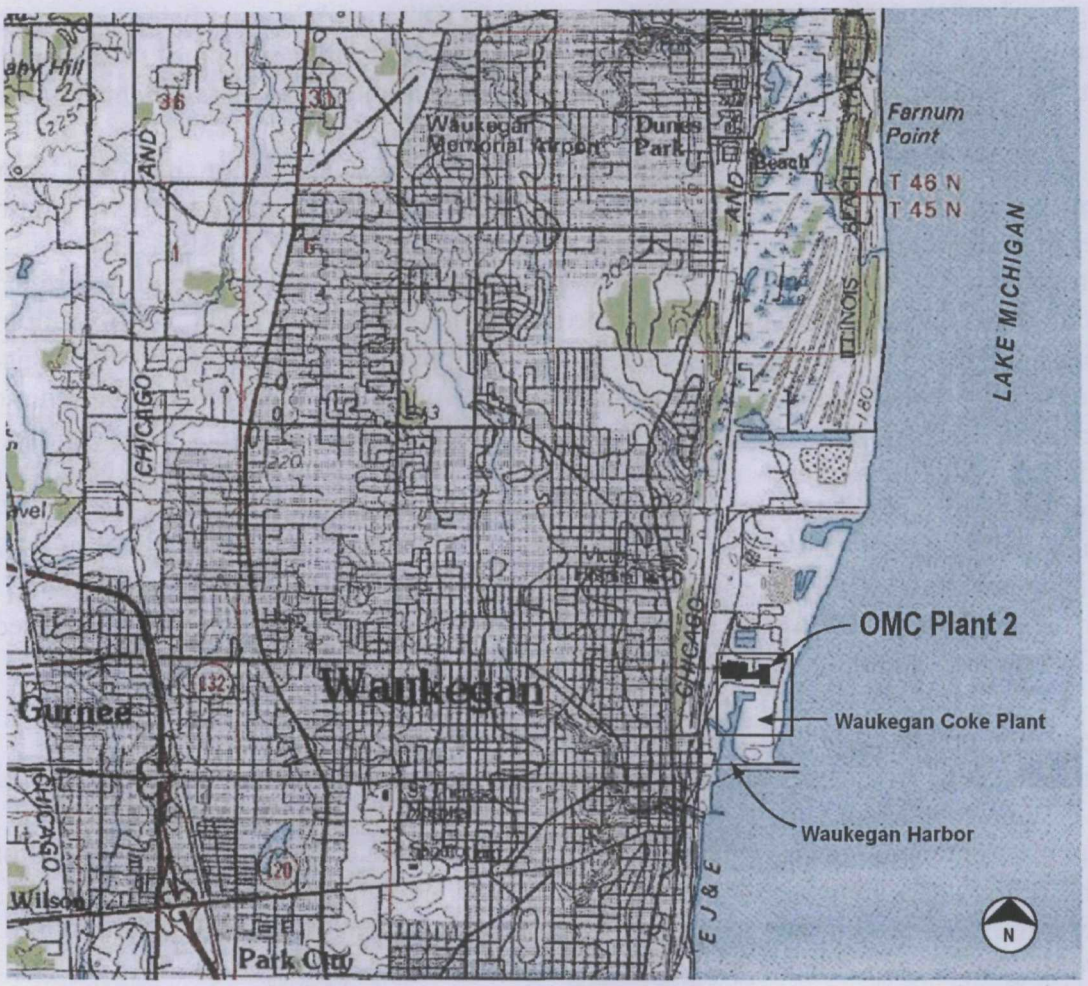
List of Acronyms

AOC	Administrative Order by Consent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CD	Consent Decree
DNAPL	Dense Non-Aqueous Phase Liquid
ESD	Explanation of Significant Differences
FDA	Food and Drug Administration
IDNR	Illinois Department of Natural Resources
IDPH	Illinois Department of Public Health
IEPA	Illinois Environmental Protection Agency
ICs	Institutional Controls
ICIAP	Institutional Controls Implementation and Assurance Plan
LTS	Long-term stewardship
MCL	Maximum Contaminant Level
mg/kg	Milligrams per kilogram ("parts per million")
mg/L	Milligrams per liter ("parts per million")
MNA	Monitored natural attenuation
NCP	National (Oil and Hazardous Substances Pollution) Contingency Plan
NPL	National Priorities List
ODC	Old Die Cast
O&M	Operation and maintenance
OMC	Outboard Marine Corporation
OU	Operable unit
PAHs	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PPB	Parts per billion
PPM	Parts per million
PRP	Potentially responsible party
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RI/FS	Remedial Investigation and Feasibility Study
SWAC	Surface weighted average concentration
TCE	Trichloroethene
TSCA	Toxic Substances Control Act
µg/L	Micrograms per liter ("parts per billion")
VI	Vapor Intrusion
VOCs	Volatile organic compounds
WCP	Waukegan (Manufactured Gas and) Coke Plant
EPA	United States Environmental Protection Agency

Executive Summary

Introduction

The Outboard Marine Corporation (OMC) National Priorities List (NPL) site is located in Waukegan, Illinois, about 40 miles north of Chicago (see map – lower right).



Source: USGS Waukegan Quadrangle Map

The United States Environmental Protection Agency (EPA) has divided the OMC site into four operable units (OU):

OU 1: Waukegan Harbor site
OU 2: Waukegan Manufactured Gas and Coke Plant site
OU 3: PCB Containment Cells
OU 4: OMC Plant 2 site

OMC completed a cleanup action at OU1 of the OMC Site under EPA oversight at the Waukegan Harbor site from 1990-1993. In accordance with EPA's 1984 Record of Decision (ROD) and 1989 ROD Amendment, OMC dredged the northern harbor area to remove sediment contaminated with polychlorinated biphenyls (PCBs) and excavated some PCB-laden soils around its OMC Plant 2 facility (OU4) to achieve a 50 milligrams per kilogram [mg/kg or parts per million (ppm)] PCB cleanup level. OMC treated some of the more highly contaminated dredged spoils to remove PCB oil for off-site destruction and constructed three containment cells (designated as OU 3), in accordance with the 1989 ROD Amendment, on its property to hold both treated and untreated sediment and soil containing PCBs above 50 ppm[1]. Afterwards, OMC began the long-term operation and maintenance (O&M) of the PCB Containment Cells.

EPA concluded in the 2007 Five-Year Review that the Waukegan Harbor site (OU 1) is not protective because PCB levels in certain fish caught in Waukegan Harbor are up to ten times higher than EPA's protective level for human health. As a result, EPA issued a ROD Amendment in October 2009, to hydraulically dredge sediment from the harbor where PCB concentrations exceed 1 ppm followed by the application of a 6 inch sand layer in order to achieve a 0.2 ppm PCB surface weighted average sediment concentration (SWAC). This remedial action will result in a reduction in PCB contamination by ten times in the sediment and reduce estimated risks to consumers eating harbor fish to acceptable levels. Dredging is scheduled to begin in September 2012. The dredged sediment is to be placed in geotextile tubes to dewater, and consolidated into a new containment cell located between the East and West Containment Cells of OU 3. Leachate from the new cell will be treated and discharged to drainage ditch at the north end of OU 4. A geotextile and rock cap will be placed on harbor sediment that is too close to the harbor walls to safely dredge. Harbor-caught fish and sediment will then be monitored to track cleanup effectiveness.

During the course of cleaning up the harbor sediment in OU 1, OMC discovered soil contaminants on an adjacent property it owned; the Waukegan Manufactured Gas and Coke Plant ("Waukegan Coke Plant" [WCP]), designated OU 2 of the OMC site. One of the potentially responsible parties (PRPs) for the WCP site conducted a remedial investigation and feasibility study (RI/FS) at the WCP site from 1992 to 1999. EPA then signed a ROD in September 1999 selecting soil and groundwater cleanup actions for the WCP portion of the site. Two of the WCP site PRPs completed the soil clean up work at the site in November 2005 under EPA oversight and then constructed and operated a groundwater pump-and-treat system from 2007 to 2011 to remove the more highly contaminated groundwater. Soil and active groundwater remediation at OU2 is now complete. A monitored natural attenuation (MNA) remedy is now planned at OU 2, in accordance with the 1999 ROD, to address residual

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1 PCB wastes are generally regulated for disposal under Toxic Substance Control Act (TSCA) at concentrations of 50 ppm. The requirements for the disposal of PCB liquids and PCB items are codified at 40 CFR 761.60. Disposal requirements for PCB remediation waste or PCB bulk product waste are codified in 40 CFR 761.61 and 761.62, respectively. Material containing PCBs at 50 ppm or higher will be disposed of at a facility that is in compliance with TSCA regulations and the remainder (containing less than 50 ppm PCBs) will be disposed of in a facility that is in compliance with 35 Illinois Administrative Code (IAC) Section 811 (a "municipal landfill").

groundwater contaminants. MNA at OU 2 is expected to begin by summer 2012 and is estimated to be required for approximately 90 years.

OMC declared bankruptcy in December 2000. EPA and the bankruptcy trustee for OMC reached agreement on terms under which the bankruptcy estate could abandon the company's 1,000,000 square-foot building and adjacent property (OU 4). Plant 2, and the surrounding property were abandoned in December 2002. EPA conducted several removal actions at the OMC Plant 2 site from 2001-2003 to stabilize or remove hazardous wastes from the building and completed an RI/FS at the site in April 2006. The city of Waukegan purchased the WCP site in July 2002 from the OMC bankruptcy trustee and obtained title to the abandoned OMC Plant 2 property and the three containment cells in 2005 as a part of an overall strategy to redevelop its lakefront area into a mixed-use residential area. EPA signed a ROD for OU 4 in September 2007, under which EPA was to demolish and dispose of the contaminated buildings and excavate and dispose of the contaminated site soil and sediment from an on- and off-site ditch. The buildings have since been demolished and the building contamination has been disposed of offsite. Remedial work has removed most of the contaminated soil and sediment from OU 4. However, due to difficulties removing soil and sediment in some areas, a ROD Amendment and an Explanation of Significant Differences (ESD) will be prepared in 2012 to complete the OU 4 remedy. In February 2009, EPA signed a ROD for remedial actions to address trichloroethene (TCE) contaminated groundwater at OU4 and pools of dense non-aqueous phase liquid (DNAPL)[2] of TCE found in the subsurface soil beneath the former plant building. Treatment of the DNAPL plume was completed in December 2011, and the first phase of treatment for the TCE plume using sodium permanganate as an oxidizer was initiated during spring 2012.

EPA, in consultation with Illinois Environmental Protection Agency (IEPA), has determined in this Five-Year Review that the OMC Site remedy at OU 1 (Waukegan Harbor) is not protective of human health and the environment in either the short or long term because the sediment clean-up remedy, as identified in the October 2009 ROD Amendment, is not yet complete. Once the PCB cleanup level for harbor sediments has been reached, short-term protectiveness at OU1 will be achieved. Long-term protectiveness at OU1 will be achieved through the following actions: continue implementation of fish-consumption advisory for the northern Waukegan Harbor area until they are no longer necessary, implementation of long-term fish monitoring and development and implementation of effective ICs to protect the sediment cap areas near the seawall.

The remedy at OU 2 (the Waukegan Manufactured Gas and Coke Plant) is protective of human health and the environment in the short term. Soil cleanup is complete and there is no groundwater use. Long-term protectiveness at OU 2 will be achieved by the following actions: implementation of the EPA-approved monitored natural attenuation plan and continued

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2 DNAPLs are high concentrations of chlorinated solvents, such as trichloroethylene, that are denser than water. Because of their physical and chemical properties, they sink to the bottom of the groundwater aquifer and do not mix easily with water, acting as a continual source of groundwater contamination until they are removed. Other DNAPLs include transformer oil, which usually includes mixtures of polychlorinated biphenyls (PCBs).

implementation and monitoring of the ICs developed in accordance the 2004 Consent Decree along with long-term stewardship.

The remedy at OU 3 (the PCB Containment Cells) is protective of human health and the environment in the short term because the existing cells adequately contain the contaminated sediment and soil to prevent human and ecological exposures. Long-term protectiveness at OU 3 will be achieved by the following actions: completion of the final containment cell; an adequate O&M plan to address all potential maintenance issues; and development, implementation, and monitoring of effective ICs.

The remedy at OU 4 (OMC Plant 2) is protective of human health and the environment in the short term. Soil and sediment remediation are nearly complete and there are no drinking water wells that could result in short-term exposures to contaminated groundwater. Site fences provide a barrier to casual site users (trespassers). Long-term protectiveness at OU 4 will be achieved by the following actions: implementation of the 2012 ROD Amendment and Explanation of Significant Differences (ESD) addressing the remaining contaminated soil and groundwater at depth; performance of a VI study to confirm that there are no offsite human health risks from contaminated groundwater vapors; and once the groundwater remedy is complete, the ICs and long-term stewardship procedures will be reviewed to ensure that they are effective.

Long-term stewardship (LTS) must be ensured at the OMC site. Since long-term protectiveness requires implementation of effective ICs that are monitored, maintained, and enforced, an IC Plan will be prepared by EPA to identify the required IC activities and the roles and responsibilities of the parties for each, along with the specific need for an Institutional Controls Implementation and Assurance Plan (ICIAP) or IC work plan to be submitted by the PRPs to fulfill their responsibilities to ensure ICs are in place and effective to prevent exposure risk.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Outboard Marine Corporation (OMC)		
EPA ID: ILD 000802827		
Region: 5	**State:** IL	**City/County:** Waukegan/Lake County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name:**
Author name (Federal or State Project Manager): Timothy Drexler
Author affiliation: EPA Superfund Division
Review period: 09/06/2011 – 06/26/2012
Date of site inspection: January 27, 2012
Type of review: Statutory
Review number: Fourth
Triggering action date: September 26, 2007
Due date *(five years after triggering action date)*: September 26, 2012

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU: 1	Issue Category: Remedy Performance			
	Issue: Initial sediment cleanup levels in Waukegan Harbor were not protective of human health and the environment. Certain species of harbor-caught fish are contaminated with levels of PCBs that are unsafe for human consumption. ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.			
	Recommendation: 1A. Complete cleanup pursuant to EPA's October 2009 ROD Amendment. 1B. Maintain existing fish-consumption advisory for the harbor. Re-evaluate during next 5-Year Review. 1C. Develop and implement IC Plan to protect the sediment caps that will be placed adjacent to harbor seawalls along with long-term stewardship then develop ICIAP			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	1A. EPA/IEPA 1B. Illinois Dept of Public Health 1C. EPA/IEPA	1A. EPA 1B. EPA/IEPA 1C. EPA/IEPA	1A. Nov. 2013 1B. June 2017 1C. April 2014

OU: 2	Issue Category: Remedy Performance			
	Issue: Residual groundwater contamination remains at the Waukegan Coke Plant following completion of soil cleanup and active groundwater remediation. ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.			
	Recommendation: 2A. Implement the groundwater remedy for MNA at the Waukegan Coke Plant as identified in the September 1999 ROD and October 2004 Consent Decree. 2B. Develop IC Plan and ICIAP			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	2A. PRPs 2B. EPA/IEPA/ PRPs	EPA/IEPA	2A. MNA start: April 2012 2B. April 2014

OU: 3	Issue Category: Institutional Controls			
	Issue: Enforceable ICs are not in place and functioning for long-term protectiveness of the contaminated soil/sediment containment cells			
	Recommendation: 3. Once construction of the final containment cell is complete, develop and implement an IC work plan to protect the integrity of the contaminated sediment/soil containment cells, then develop an ICIAP along with long-term stewardship.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	3A. EPA/IEPA/ City of Waukegan/PRPs	EPA/IEPA	3A. April 2015

OU: 3	Issue Category: Operations & Maintenance			
	Issue: Complete O&M, including any necessary below grade remediation, is not in place for long-term protectiveness of the contaminated soil/sediment containment cells			
	Recommendation: Once construction of the final containment cell is complete, develop and implement an O&M work plan to protect the integrity of all of the contaminated sediment/soil containment cells			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/IEPA	EPA/IEPA	Dec. 2014

OU: 4	Issue Category: Remedy Performance			
	Issue: Cleanup of Plant 2 area groundwater contamination is not complete. Confirm no vapor intrusion into the buildings of Larsen Marine Service, a nearby business. ROD Amendment and ESD are needed in order to complete soil and sediment remedy. ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.			
	Recommendation: 4A. Complete groundwater cleanup actions for Plant 2 area as identified in the February 2009 ROD. 4B. Complete VI study of Larsen Marine Service buildings to confirm that there are no potential human health risks. 4C. Issue ROD Amendment for ODC Area/utilities soils and ESD for East Containment Cell extension and North Ditch Cap. 4D. Develop IC Plan and ICIAP			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	4A. EPAIEPA 4B. EPA/IEPA 4C. EPA/IEPA	EPA/IEPA	4A. August 2016 4B. July 2012 4C. ROD Amendment: July 2012 ESD: July 2012

		4D. EPA/IEPA /City of Waukegan		4D. April 2014

Operable Unit:	*Protectiveness Determination:*
1	Not Protective

Protectiveness Statement:

EPA has determined that the remedy at OU 1 (Waukegan Harbor) is not protective of human health and the environment in either the short or long term because the sediment clean-up remedy, as identified in the October 2009 ROD Amendment, is not yet complete. Once the PCB cleanup level for harbor sediments has been reached, short-term protectiveness at OU1 will be achieved. Long-term protectiveness at OU1 will be achieved through the following actions: continue implementation of fish-consumption advisory for the northern Waukegan Harbor area until they are no longer necessary, implementation of long-term fish monitoring and development and implementation of effective ICs to protect the sediment cap areas near the seawall.

Operable Unit: 2	*Protectiveness Determination:*
2	Protective in the Short term

Protectiveness Statement:

EPA has determined that the remedy at OU 2 (the Waukegan Manufactured Gas and Coke Plant) is protective of human health and the environment in the short term. Soil cleanup is complete and there is no groundwater use. Long-term protectiveness at OU 2 will be achieved by the following actions: implementation of the EPA-approved monitored natural attenuation plan and continued implementation and monitoring of the ICs developed in accordance the 2004 Consent Decree along with long-term stewardship.

Operable Unit: 3	*Protectiveness Determination:*
3	Protective in the Short term

Protectiveness Statement:

EPA has determined that the remedy at OU 3 (the PCB Containment Cells) is protective of human health and the environment in the short term because the existing cells adequately contain the contaminated sediment and soil to prevent human and ecological exposures. Long-term protectiveness at OU 3 will be achieved by the following actions: completion of the final containment cell; an adequate O&M plan to address all potential maintenance issues; and development, implementation, and monitoring of effective ICs.

Operable Unit:	*Protectiveness Determination:*
4	Protective in the Short Term

Protectiveness Statement:

EPA has determined that the remedy at OU 4 (OMC Plant 2) is protective of human health and the environment in the short term. Soil and sediment remediation are complete and there are no drinking water wells that could result in short-term exposures to contaminated groundwater. Site fences provide a barrier to casual site users (trespassers). Long-term protectiveness at OU 4 will be achieved by the following actions: implementation of the 2012 ROD Amendment and Explanation of Significant Differences (ESD) addressing the remaining contaminated soil and groundwater at depth; performance of a VI study to confirm that there are no offsite human health risks from contaminated groundwater vapors; and once the groundwater remedy is complete, the ICs and long-term stewardship procedures will be reviewed to ensure that they are effective.

Fourth Five-Year Review Report

I. Introduction

EPA Region 5, in consultation with the IEPA, has conducted the fourth Five-Year Review for the OMC Superfund site, Waukegan, Illinois. EPA conducted this review from September 6, 2011 through June 2012, covering all four operable units at the site. This report documents the results of the fourth Five-Year Review at the OMC site.

Purpose

EPA conducts a Five-Year Review to determine whether a cleanup remedy at a site is, or is expected to be, protective of human health and the environment. EPA documents the review methods, findings, and conclusions in Five-Year Review reports.

Authority

EPA prepared this Five-Year Review report pursuant to CERCLA § 121 and the National Contingency Plan (NCP). Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or "Superfund" states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

EPA interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR § 300.430(f)(4)(ii) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Triggering Action

A Five-Year Review is necessary at the OMC site because hazardous substances, pollutants, or contaminants at the site remain above levels that allow for unlimited use and unrestricted exposure (UU/UE). Hazardous substances, pollutants, or contaminants were left on site after an initial remedial action (RA) was completed in Waukegan Harbor in 1993, and will be managed

on site in some non-harbor areas of the site after cleanup actions are completed in November 2013.

The triggering action for this statutory review is the date of the third Five-Year Review for the OMC site as shown in EPA's CERCLIS database: September 26, 2007. EPA shall undertake future Five-Year Reviews at the OMC site using previous trigger dates as long as hazardous substances, pollutants, or contaminants remain on site above levels that allow for UU/UE.

II. Site Chronology

Table 1 summarizes the site chronology to date:

Table 1: Chronology of OMC Site Events

Event	Date
Initial discovery of contamination	**c. 1976**
Pre-NPL responses	**c. 1976**
NPL listing	**September 1983 (Interim NPL: Oct. 1981)**
Remedial Investigation/Feasibility Study complete	**April 1984, March 1989 (OU 1 and 3)** **September 1999 (OU 2)** **December 2006, August 2008 (OU 4)**
ROD signature	**April 1984 (OU 1 and 3)** **September 1999 (OU 2)** **September 2007, February 2009 (OU 4)**
ROD Amendment	**March 1989, October 2009 (OU 1)** **September 2012 (OU 4) pending**
Explanation of Significant Differences	**September 2004 (OU 2) – for site re-use** **March 2008 (OU 3) – for site re-use** **June 2012 (OU 4) pending**
Consent Decrees	**April 1989 (OUs 1 and 3)** **October 2004 (OU 2)** **June 2005 (OU 3 and 4)** **September 2005 (OU 4)**
Remedial design starts	**April 1989 (OUs 1 and 3)** **July 2002 (OU 2)** **June 2007 (OU 4)**
Remedial designs complete	**October 1990 (OUs 1 and 3)** **March 2006 (OU 2)** **December 2007 (OU 4)** **July 2008 (OU 4)** **September 2010 (OU 1)**

Event	Date
Remedial action starts	**October 1990 (OUs 1 and 3)** **November 2004 (OUs 2 and 4)**
Construction dates (start, finish)	**October 1990- N/A (OUs 1 and 3)** **November 2004 – July 2008 (OU 2)** **December 2009 – December 2012 estimate(OU 4)**
First Five-Year Review	**September 30, 1997**
Second Five-Year Review	**September 26, 2002**
Third Five-Year Review	**September 26, 2007**
Construction completion date	**Estimated 2013 (Site-wide) ****
Final Close-out Report	**Estimated 2016 (Site-wide) ****
Deletion from NPL	**Estimated 2028 ****

Note: ** = Projected date

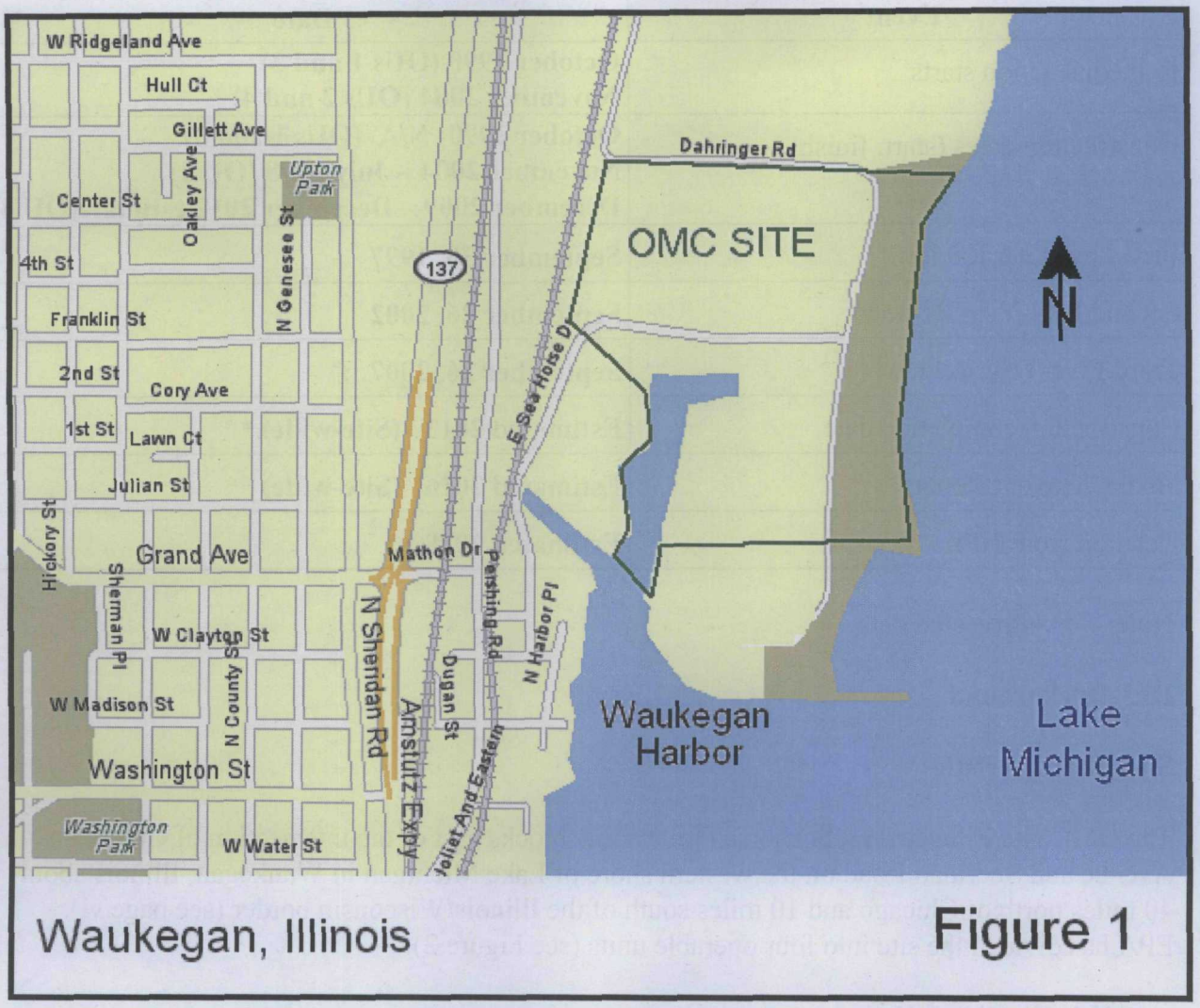
III. Background

Site Characteristics

The OMC site is located on Seahorse Drive a few blocks east of the intersection of Grand Avenue and Sheridan Road on the western shore of Lake Michigan in Waukegan, Illinois about 40 miles north of Chicago and 10 miles south of the Illinois/Wisconsin border (see page vi). EPA has divided the site into four operable units (see Figure 2):

OU 1: Waukegan Harbor
OU 2: Waukegan Manufactured Gas and Coke Plant (Waukegan Coke Plant)
OU 3: PCB Containment Cells
OU 4: OMC Plant 2

The OMC site is located within an area of industrial facilities and a marina that are situated around Waukegan Harbor. It is also next to the city beach. Thus, while not situated next to densely populated residential areas, a fair number of people frequent the harbor area to work, fish in the harbor, use the beach, and boat in the harbor and marina. Some of the beachfront areas on the site include ecologically-important emergent duneland environments with critical habitat for the piping plover, a federally protected endangered species, and also contains several state-protected plant species.



OU 1: Waukegan Harbor

Waukegan Harbor is irregularly shaped and is about 37 acres in area. Water depths in the harbor generally vary from 14 to 20 feet. Harbor sediment consists of one to seven feet of very soft organic silt (muck) overlying an average of four feet of medium dense, fine- to coarse-grained sand. Glacial till or "lake clay" underlies the sand and typically ranges from 50 to more than 100 feet thick. The harbor side walls are shored up with 20- to 25-foot steel sheet piling, except at the Waukegan Port District boat launching areas and at the retaining wall near the harbor mouth.

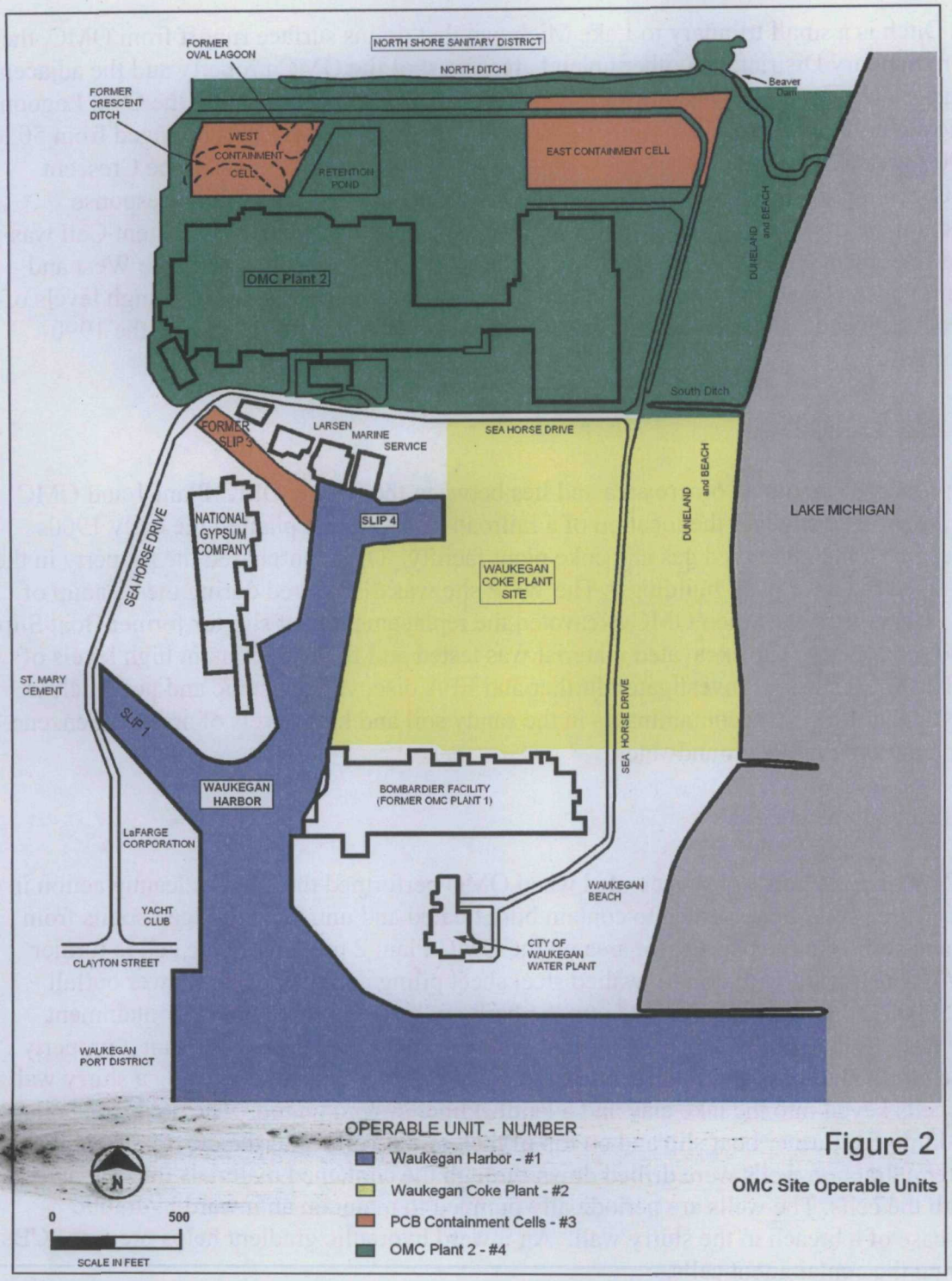


Figure 2

OMC Site Operable Units

The original areas of concern within the harbor were former Boat Slip #3 and the upper harbor area (north of Boat Slip #1), where large quantities of PCBs were deposited in the sediment after OMC discharged PCBs and other fluids from its manufacturing facility (OMC Plant 2) during the 1960s and 1970s. Sediment PCB concentrations in former Boat Slip #3 were greater than 500 milligrams per kilogram [mg/kg or "parts per million" (ppm)] and PCB concentrations were between 50 and 500 ppm in the upper harbor.

The North Ditch is a small tributary to Lake Michigan that drains surface runoff from OMC, the North Shore Sanitary District, and other upland areas west of the OMC property and the adjacent railroad tracks. The drainage system formerly included the Crescent Ditch and the Oval Lagoon as well. However, PCB contamination in the Crescent Ditch and Oval Lagoon ranged from 50 to over 10,000 ppm. OMC removed hot-spot contamination (over 10,000 ppm) in the Crescent Ditch and Oval Lagoon during the Waukegan Harbor cleanup action (see Initial Response Actions section, below). These features now no longer exist as the West Containment Cell was constructed over them (Figure 2). A nine-acre parking lot area, located between the West and East Containment Cells north of the OMC Plant 2 facility, was contaminated with high levels of PCBs (between 50 and 5,000 ppm). This area was also cleaned up by OMC during the 1990-1993 harbor RA.

OU 2: Waukegan Coke Plant

The WCP property is about a 36-acre area and lies between the former OMC Plant 1 and OMC Plant 2 facilities. The site was the location of a railroad tie-treatment plant in the early 1900s and later became a manufactured gas and coke plant facility. OMC purchased the property in the 1970s and razed the coke plant buildings. The WCP site was discovered during the cleanup of Waukegan Harbor in 1990, when OMC excavated the replacement boat slip for former Boat Slip #3 on its WCP property. The excavated material was tested and found to contain high levels of creosote. The WCP site was investigated further and EPA discovered arsenic and polynuclear aromatic hydrocarbon (PAH) contaminants in the sandy soil and high levels of arsenic, benzene, phenol, and ammonia in the groundwater.

OU 3: PCB Containment Cells

The PCB Containment Cell OU was created when OMC performed the harbor cleanup action in 1990-1993. Three cells were created to contain both treated and untreated dredged spoils from the harbor and soil from the parking lot area on the OMC Plant 2 property. One cell is former Boat Slip #3, constructed with double-walled steel sheet piling and located at a sewer outfall from OMC Plant 2 that discharged PCBs into the harbor. The other two ("East Containment Cell" and "West Containment Cell") are located on the north side of the OMC Plant 2 property between the North Ditch and the Plant 2 building. Each cell was constructed using a slurry wall around the cells keyed into the lake clay and a landfill liner system on top. The dredged spoils were placed into the former boat slip and on top of the ground surface of the other cells. Groundwater extraction wells were drilled down through the contained materials into the native sand beneath the cells. The wells are periodically pumped to maintain an inward hydraulic gradient in case of a breach in the slurry wall. An inward hydraulic gradient helps prevent PCBs from escaping the containment cells.

OU 4: OMC Plant 2

OMC Plant 2 was an abandoned 1,000,000 ft^2 facility in which OMC manufactured outboard engine parts from about 1949 until it declared bankruptcy in December 2000. The facility was the source of PCB contaminants in the harbor. EPA completed an RI/FS at the 65-acre OMC

Plant 2 site in December 2006 and documented areas of PCB and PAH contamination in soil and in the abandoned building. EPA also documented a large amount of chlorinated solvent in the ground and groundwater beneath the building.

Land and Resource Use

Waukegan Harbor, OU 1, currently is being used to serve both industrial facilities and recreational boaters. Larsen Marine Service, Inc. operates a recreational boat storage and repair business with a capacity of over 800 boats along the north harbor area. The Waukegan Port District runs a recreational and commercial marina in the southern area of the harbor. Recreational and commercial boaters can access Lake Michigan from these two areas. St. Mary's Cement, LaFarge Cement, and National Gypsum industrial facilities receive raw materials via large supply ships or barges that are unloaded in Boat Slip #1. Bombardier Motor Products, the current owner of the old OMC Plant #1 building, tests boat engines in the harbor alongside its facility.

The Waukegan Coke Plant, OU 2, is not being used at this time. The site is fenced and the city of Waukegan, the current property owner, performs routine maintenance tasks on the fence and periodically mows the grass.

There is no current use of the PCB Containment Cells (OU 3).

The city of Waukegan has title to the OU 4 property, but remediation continues at the former location of OMC Plant 2 to clean up site soil, sediment and groundwater. Demolition of all site buildings, with the exception of the Triax Building, is complete. During 2012-13, OU 4 will support OU 1 harbor sediment remediation activities. A fourth containment cell will be constructed at OU 4 between the East and West Containment Cells for the additional contaminated harbor sediments. A temporary water treatment plant will also be constructed at the remaining Triax Building in OU 4 to treat water associated with dredging prior to its discharge back to the harbor.

There is no known use of groundwater or surface water as a drinking water supply at or near the OMC site. The city water supply system is located just south of former OMC Plant #1 and the intake is located more than 1000 feet from the shore into Lake Michigan. All other facilities in the area are served by the city water supply system.

Waukegan has released a master plan for redevelopment of its lakefront area (see Figure 3). Based upon this plan and current uses of the area, EPA projects the following future land uses for the OMC site:

Legend

OMC Plant 2 Building Outline

Feet

0 500 1000

Source: Waukegan Lakefront-Downtown Master Plan/Urban Design Plan (Skidmore, Owings & Merrill LLP, June 23, 2003)

Figure 3

Waukegan's Master Plan for Harborfront and North Harbor Development Districts

OMC Plant 2 and Vicinity

OU 1: Waukegan Harbor – Marine recreational, commercial, and industrial use for the harbor will be maintained. Although the city's master plan calls for de-industrialization of the harbor to facilitate area-wide mixed-use development, none of the businesses have expressed willingness to leave their harbor locations over the short term.

OU 2: Waukegan Coke Plant – OU 2 was projected in the 1999 ROD to remain a commercial/industrial-use property due to its location between the then-operating OMC Plants 1 and 2. The city of Waukegan purchased the site from OMC following the OMC bankruptcy declaration and has rezoned it to high-density residential. The city plans to release a request for proposals to redevelop the WCP site in accordance with its master plan (Figure 3) and its area rezoning efforts.

OU 3: PCB Containment Cells – OMC, the owner of the PCB Containment Cells when they were constructed, was not expected to use the containment cells, except perhaps as surficial green space, so that the contents would not be disturbed. The city of Waukegan master plan calls for the surfaces of the east and west containment cells to be configured for use as parkland.

OU 4: OMC Plant 2 – OU4 was previously projected to be reused as an industrial facility upon completion of cleanup actions at the site. However, the city's master plan calls for a mixed-use development on the OMC Plant 2 property plus establishment of parkland. Any potential reuse of OU 4 will not occur until OMC site cleanup work is complete after 2013. The city is likely to demolish and dispose of the Triax Building after remediation is complete, in accordance with the city's redevelopment plan.

History of Contamination

OMC Plant 2 and Waukegan Harbor

From about 1961 to 1972, OMC purchased a hydraulic fluid that contained PCBs for use in its die-casting works at the OMC Plant 2 facility. During the manufacturing process some of the hydraulic fluid spilled into the floor drains which discharged to an oil interceptor system that discharged PCB-laden oil to the North Ditch. Some of the PCB-laden oil was also released directly to Waukegan Harbor. The harbor-area discharge outlet was located in the western end of Boat Slip #3 and the north property discharge was into the Crescent Ditch. As a result, large quantities of PCBs were released into Waukegan Harbor and on OMC property into the North Ditch, Oval Lagoon, Crescent Ditch, and in the Parking Lot Area. It was estimated that over 700,000 pounds of PCBs were deposited on OMC property and 300,000 pounds of PCBs were discharged into Waukegan Harbor. After the state of Illinois documented PCB contamination in the harbor in 1976, OMC reportedly sealed the discharge pipe to the harbor later that year.

OMC also operated several large vapor degreasers at the OMC Plant 2 facility to clean newly made parts with TCE. Poor operating practices apparently led to TCE spills, resulting in the existing large groundwater contaminant plume beneath the OMC Plant 2 site.

Waukegan Coke Plant

The WCP property was the site of a railroad tie treatment plant from about 1908-1917 and the tie plant is the likely source of the creosote that was discovered in the soil that was excavated from the replacement boat slip for Larsen Marine Service. Later, from about 1928 until 1969, the site contained a manufactured gas plant and then a coke plant which was the source of the arsenic and PAHs in soil and groundwater. OMC purchased the WCP property in the 1970s, demolished the coke plant, and then used the property for parking, fire-fighting training, and snowmobile testing.

Initial Response Actions

EPA, pursuant to CERCLA, placed the OMC site on the Interim Priorities List in 1981 and on the National Priorities List (NPL) in 1983. EPA initiated an RI at the site in 1982 to determine the nature and extent of PCB contamination in the harbor and on selected areas of OMC Plant 2 property (*e.g.* the North Ditch). Afterwards, EPA completed a feasibility study (FS) report in early 1984. EPA analyzed various alternative cleanup remedies in the FS that would clean up the PCB contamination in the areas of concern. EPA released a proposed cleanup plan for public comment and then signed a ROD in April 1984, selecting a harbor cleanup remedy that was estimated to cost $21 million to implement. The remedy is detailed in Section IV of this report (Remedial Actions) under "Remedy Selection and Implementation" (page 12).

Remedial design (RD) was initiated by EPA, but in late 1985, EPA was forced to suspend design work on the project due to the litigation between EPA and OMC. EPA initiated the litigation due to OMC's refusal to grant access to its property to perform the necessary tasks to complete the RD.

CERCLA was reauthorized in October 1986 while the OMC litigation was pending. The new law, the Superfund Amendments and Reauthorization Act (SARA), contained the Congressional preference for the selection of "permanent remedies which reduce the mobility, toxicity, or volume of hazardous substances" at NPL sites. Although RODs signed prior to October 1986 were not required to meet the new requirements of SARA, EPA reevaluated the 1984 OMC site ROD to develop a remedy more consistent with the requirements of SARA.

The new law also gave EPA access rights to NPL sites. Consequently, as EPA began to review the selected remedy for consistency with SARA, EPA and OMC agreed to end the litigation over access rights. OMC then submitted a proposal to clean up what became OU 1 and portions of OU 4. In 1989, EPA, IEPA, and OMC entered into a Consent Decree (CD) under which EPA would oversee the cleanup of OU 1 and portions of OU 4 of the site by OMC. Because the OMC remedy proposal varied from the 1984 ROD, EPA signed a ROD Amendment in 1989 that incorporated the changes into the selected remedy. These changes are presented in Section IV of this report.

OMC began cleanup work in 1990. However, when OMC began to construct a replacement boat slip for Larsen Marine Service on the WCP property, it discovered that some of the excavated soil was contaminated with creosote. OMC excavated the new boat slip and constructed a

temporary storage area to manage the contaminated soil until the rest of the harbor cleanup was completed. Because the excavated area was within a portion of the former WCP property owned by OMC, EPA designated the area as OU 2 of the OMC site. The EPA also identified several other PRPs for the WCP site. One of them, North Shore Gas, completed an RI/FS in November 1998 and EPA signed a ROD for the cleanup of the WCP site in September 1999.

Basis for Taking Actions

Contaminants of Concern

Hazardous substances or pollutants that have been released at the OMC site (compiled from all OUs) include:

Soil: PCBs, PAHs, arsenic, chlorinated-volatile organic compounds (VOCs)

Groundwater: Arsenic, ammonia, phenol, benzene, chlorinated-VOCs

Sediment: PCBs, PAHs (OU 4)

Contaminant Exposures

Actual or potential human exposures to contaminants of concern (COCs) in sediments, soil, and groundwater are associated with human health risks due to levels that exceed EPA's risk management criteria [(i.e. excess lifetime carcinogenic risk exceeds the risk range of 1×10^{-4} to 1×10^{-6} and/or non-carcinogenic hazards exceed a hazard index (HI) quotient of 1)] under reasonable exposure scenarios. Specific exposure pathways that served as the basis for CERCLA action included exposure to contaminated soil and groundwater and ingesting fish from Waukegan Harbor. Potential carcinogenic risks were very high for exposures to arsenic and benzene in OU 2 site groundwater (values up to 70 mg/L) and chlorinated-VOCs in the groundwater beneath OU 4 (TCE and vinyl chloride in some areas exceeded 10 mg/L), as these compounds exceed Safe Drinking Water Act maximum contaminant levels (MCLs) or other protective levels. Additionally, ammonia levels were very high in OU 2 (up to 2,500 mg/L) and created a high hazard index for groundwater.

Potential carcinogenic risks were very high for PCBs in surface soils at OU 4, as PCB concentrations initially exceeded 10,000 ppm and still exceeded 50 ppm in some areas after initial remediation. Arsenic and PAHs exceeded protective levels in OU 2 soil for plausible exposure scenarios.

Actual or potential environmental receptor exposures to PCBs in the harbor sediments caused PCB concentrations to accumulate to harmful levels in fish even after the initial remediation. Humans who catch and eat the fish, as well as other terrestrial or aquatic wildlife that eat the fish will be exposed to potentially harmful levels of PCBs.

IV. Remedial Actions

Remedy Selection and Implementation

OU 1/OU 3: Waukegan Harbor and the Contaminated Sediment/Soil Containment Cells

In its 1984 ROD, EPA identified PCB contamination up to 500,000 mg/kg in Waukegan Harbor sediment and PCB levels in harbor fish over 19 ppm that resulted in unacceptable human health risks from eating that fish. The 1984 ROD called for dredging harbor sediments and nearby site soils to remove PCBs. In 1989, EPA issued a ROD Amendment to modify the Waukegan Harbor remedy to include the following cleanup tasks for OU 1, creating OU 3 in the process. The ROD Amendment called for the following:

- A new boat slip (Boat Slip #4) would be constructed on the east side of the upper harbor area on OMC property (the WCP property) to replace PCB-contaminated Boat Slip #3. Larsen Marine Service, the owner of Boat Slip #3, would be moved to Boat Slip #4.

- Boat Slip #3 would be permanently isolated from the upper harbor area by constructing a double-walled, braced, and soil-backfilled sheet pile cutoff wall around it. After the slip was isolated, a permanent PCB-containment cell would be built in the former slip by constructing an impermeable clay slurry wall with a minimum thickness of three feet around the slip. The slurry wall would be keyed three feet into the underlying clay till.

- Sediments from Boat Slip #3 with PCB concentrations in excess of 500 ppm would be removed from the former slip and treated on-site to remove and appropriately dispose of PCBs (see below). The upper harbor would be dredged and contaminated sediments exceeding a 50 ppm PCB cleanup level would be removed. The dredged materials would be placed in the newly-constructed former Boat Slip #3 PCB Containment Cell.

- Soils and sediments excavated from the former Boat Slip #3, North Ditch, Crescent Ditch, and Oval Lagoon areas that exceed the treatment criteria (500 ppm in Boat Slip #3, 10,000 ppm on land) would first be thermally treated on-site to remove PCBs. The treated material would be disposal of off-site in accordance with all applicable federal and state law. The non-treated material from these areas would be placed into the West Containment Cell.

- A treatment facility would be constructed for treating water generated during the remedial construction activities. Dredge water would be treated by sand filtration. Other water generated during the course of the cleanup would be treated by sand filtration to remove sediments from the water, followed by carbon adsorption to remove the contaminants.

- Once all of the materials have been deposited in the containment cells, the cells would be closed and capped with a high density polyethylene (HDPE) liner and soil cover. An extraction well system would be installed in the cells and designed to prevent the migration of PCBs from the cells by maintaining an inward hydraulic gradient.

- A permanent water treatment facility would be constructed to treat water extracted from the containment cells. Treated water would be discharged to the North Shore Sanitary District or on site.

OMC, as directed by the CD, created an entity called the Harbor Trust to implement the cleanup remedy. In April 1989, the Harbor Trust hired a remedial contractor to design and perform the cleanup of the site. The major remedial activities at the site included:

- Designing a remedy to treat and contain PCB-impacted soil and sediments in Waukegan Harbor and on surrounding land.

- Excavating and constructing boat slip #4 for the relocation of Larsen Marine Service from former Boat Slip #3.

- Isolating former Boat Slip #3 by installing vertical sheet piling and slurry walls, removing PCB-contaminated sediments from the slip for treatment, and then containing the treated upper harbor sediments in the slip with a synthetic liner cap and soil cover.

- Hydraulic dredging of designated sediments in former Boat Slip #3 for thermal treatment and hydraulic dredging of designated Upper Harbor sediment for containment in the former Boat Slip #3.

- Constructing the East and West Containment Cells on the northern area of the site by installing slurry walls and capping with synthetic liners and soil covers.

- Restoring the North Ditch by excavating the designated sediments, placing them in the West Containment Cell, and backfilling the North Ditch with clean sand.

- Constructing and operating water treatment plants to treat waters generated during construction and operation of the RA.

- Installing and operating an extraction well system at each containment cell to maintain an inward hydraulic gradient.

Major construction activity was completed in 1993 and final construction work was completed in December 1994. By then, OMC's contractor had excavated over 30,000 yd^3 of sediment and soil from the harbor and upland areas, and had thermally treated a total of 12,750 tons of PCB-contaminated soil and sediment. The treatment process consisted of anaerobic thermal desorption of the PCB oil from the soil and sediment. About 30,000 gallons of PCB oils were removed from the contaminated soil and disposed of off-site and the treated soil was placed into the containment cells.

As the remedy was performed, a number of modifications were made to the system design due to site conditions. The more significant modifications included:

- The slurry walls, on average, were keyed three and one-half feet rather than three feet into the underlying till.

- Obstructions at the surface of the clay/till layer at all three containment cells were discovered while attempting to set the slurry wall. Two of the three cells required modification to the slurry wall alignment.

- Soils contaminated with creosote were discovered in the area proposed for Boat Slip #4. As a result, the location of Boat Slip #4 and slurry wall alignment were changed.

- The WCP property was designated as OU 2, and a temporary storage area was constructed on the property to manage the contaminated soils removed from the boat slip #4 excavation.

Initially, OMC maintained an inward gradient by pumping each containment cell nearly dry and treating the pumped water with a mobile carbon-filtration system. OMC added permanent dual series carbon treatment systems to each of the containment cell extraction systems in 1996. This modification allowed for a more routine extraction rate, yielding a less severe hydraulic gradient within a containment cell.

OMC operated and maintained the PCB Containment Cells from 1993 until its bankruptcy in December 2000, submitting quarterly reports chronicling the work performed to maintain the inward hydraulic gradient, analyze groundwater samples, and maintain the HDPE liner and topsoil cap. After OMC's bankruptcy, O&M of the OU 3 cells was then performed by IEPA until the signing of a 2005 CD between the city, EPA and IEPA under which the city took title to the abandoned OMC Plant 2 property. Routine O&M of the PCB Containment Cells, including monitoring the extraction wells and the cap, is now performed by the city of Waukegan. The city's responsibility in the 2005 CD excludes, however, any O&M that may be necessary to repair the slurry wall or other compromised condition requiring below-grade remediation.

The IEPA has determined that PCB levels in harbor-caught fish continue to be above four to five ppm – which exceeds the state's 0.05 ppm consumption advisory level. In February 2006, the state issued a fish consumption advisory for Waukegan Harbor. In September 2007, the Third Five-Year Review by EPA for the OMC Site found that the original 50 ppm PCB cleanup level selected for harbor cleanup in the 1984 ROD was not protective of human health and the environment. Subsequently, the 2009 ROD Amendment established a new clean up level of 0.5 ppm in sediment due to the ongoing exceedences of PCB concentrations in harbor-caught fish posing an unacceptable risk.

OU 2: Waukegan Coke Plant

EPA signed a ROD for WCP in September 1999. The selected remedy consists of the following tasks:

- Excavate the stockpile of creosote-contaminated soil generated from the new boat slip construction and PAH-impacted soil from other areas of the site and either treat the material offsite by power plant co-burning or dispose of it in a suitable landfill.

- Solidify or stabilize arsenic-contaminated soil in place, or excavate and dispose of it in an off-site landfill.

- Cover the marginally-contaminated soils (as defined in the ROD) by a combination of asphalt (parking lot), building, and/or vegetated soil cover (cap).

- Develop a Soil Management Plan to aid in site re-use efforts.

- Develop a mobile pump-and-treat program to remove grossly contaminated groundwater from beneath the site. Water would be pumped from individual areas ("cells") on a rotating basis and treated to remove contaminants. Treated water would be re-injected into the aquifer upgradient from the pumping wells.

- After meeting groundwater cleanup targets through pump-and-treat technology, implement a Monitored Natural Attenuation (MNA) remedy to ensure that the remaining groundwater contaminant levels decrease to acceptable levels in accordance with MCLs and Illinois Groundwater Quality Standards over time.

- Place institutional controls (ICs), such as deed notices, and groundwater-use prohibitions on the property to ensure future site uses are compatible with the cleanup action.

The site soils would be cleaned up to achieve a residual excess lifetime carcinogenic risk of 1 x 10^{-5} based on an industrial or recreational site re-use scenario. Groundwater would be cleaned up to achieve MCLs or Illinois Groundwater Quality Standards for respective contaminants or protective levels, as appropriate, for beneficial uses or protection of Lake Michigan ambient water quality.

EPA signed an Administrative Order on Consent (AOC) with North Shore Gas Company and General Motors Corporation in July 2001 to begin the RD phase of the cleanup. The two PRPs began the design by further sampling the soils to more fully delineate the extent of soil contamination and to determine the feasibility of power plant co-burning versus off-site disposal in a landfill.

The two PRPs had conducted a groundwater pilot test in 2000 to observe the effects of different pumping rates for the groundwater cleanup action. They used the data during the RD phase to set up a site groundwater model to determine optimum pumping rates. They later performed a groundwater treatability test to determine applicable methods to remove the high levels of ammonia, arsenic, benzene, and phenol from the contaminant plume.

The PRPs completed the soil cleanup design plans and specifications in January 2004 and the groundwater cleanup design plans and specifications in March 2006.

EPA signed a CD in October 2004 with the city of Waukegan; the Elgin, Joliet, and Eastern Railway Company; General Motors; Larsen Marine Service, Inc.; and the North Shore Gas Company, PRPs for OU 2, to begin remedial actions at that portion of the OMC site. The first

phase of cleanup involved soil work. Soil excavation and cleanup was completed in November 2005 when a six to ten-inch layer of clean soil was placed over the site and seeded. The city of Waukegan now maintains the clean soil cover. Active groundwater remediation, via the pump and treat program at OU 2, is complete and MNA was initiated in spring, 2012.

OU4: OMC Plant 2

EPA's 1989 ROD Amendment also included initial clean up tasks at OU 4. Those tasks included the following:

- East and West Containment Cells would be constructed using the design for the former Boat Slip #3 Containment Cell. The East Containment Cell would encompass part of the OMC Plant 2 Parking Lot area and land to the east of the lot. The West Containment Cell would encompass the Crescent Ditch and Oval Lagoon area. Before constructing the West Containment Cell, soils with PCBs in excess of 10,000 ppm would be excavated and removed for treatment. The East Containment Cell would contain soils from the Parking Lot area. These soils would not receive on-site treatment because they were generally below the treatment threshold of 500 ppm.

When OMC declared bankruptcy in December 2000, it began a process of shedding all its assets, including its Waukegan-area properties. OMC Plant #1 was sold to Bombardier Motor Products, Inc. and was not believed to require action under CERCLA, but it could be subject to RCRA permitting issues. The OMC Plant 2 had no buyers, so the bankruptcy trustee petitioned the bankruptcy court to abandon the facility. EPA and IEPA filed an objection, because during an initial RCRA site inspection in 2001 and during a subsequent Superfund removal site assessment in February and March 2002, EPA discovered that a number of environmentally hazardous conditions existed in and outside the plant. Also, OMC turned over internal documents to EPA that documented the existence of a large chlorinated-VOC plume beneath OMC Plant 2.

Both the OMC bankruptcy trustee and EPA conducted several time critical removal actions to stabilize and secure the OMC Plant 2 site from 2002-2007. After the OMC bankruptcy estate petitioned to abandon the site in July 2002, EPA inspected the facility and filed an objection to the proposed abandonment. EPA negotiated a cleanup agreement in an AOC with the bankruptcy trustee under which the trustee performed several cleanup tasks at the facility under the oversight of EPA's removal program. The trustee decontaminated machinery, disposed of hazardous chemicals being stored in the facility, drained electrical transformers of PCB-oils, and paid a small sum of money into the Superfund to cover future site removal action cleanup work by EPA. After the agreed-upon work was completed, the bankruptcy court approved the abandonment of OMC Plant 2, OU 4, in December 2002.

Immediately after abandonment of OMC Plant 2, EPA began a time critical removal action to further stabilize and clean up the site. EPA disposed of additional chemical compounds, removed mercury-containing light switches, secured broken windows and doors to prevent casual access, and attempted to decontaminate PCB-contaminated concrete floors. EPA also assumed responsibility for the operation and maintenance of OU 3 for a one-year period until December 2003, at which time IEPA assumed responsibility for this work.

In January 2006, EPA began a removal action in the duneland area near the East Containment Cell because high levels of PCBs were found in the sands outside the cell. EPA excavated over 6,000 cubic yards (yds^3) of sandy soil containing 10 to 14,000 ppm PCBs and disposed of the material in approved off-site facilities. EPA also cleaned out several storm sewers leading from the OMC Plant 2 facility to prevent recontamination of the beachfront by residual PCBs discovered in the sewer lines. In January 2007, EPA undertook a final removal action to dispose of about 25 PCB-containing electrical transformers at the facility in order to prevent vandals from breaking the transformers open and dispersing PCBs into the environment. EPA also removed an extensive amount of copper wire and electrical connectors from the plant to reduce the incentive for trespassers to break into the facility and potentially expose themselves to PCBs while scavenging for copper or other materials.

EPA began a RI at OU 4 in 2004 to determine the nature and extent of contamination in site groundwater, sediment, and soil and within the OMC Plant 2 building. EPA issued the RI Report for OU 4 containing the study results and a human health and ecological risk assessment in April 2006. EPA began a Feasibility Study (FS) in 2005 to examine site cleanup alternatives designed to protect human health and the environment and issued the FS for OU 4 in December 2006. In September 2007, EPA signed a ROD for remedial actions to address remaining contamination at OU 4, exclusive of the contaminated groundwater and DNAPL locations. The OU 4 remedy called for demolition of the PCB-impacted portions of the Plant 2 building and recycling or offsite disposal; excavation and off site disposal of all site soil and sediment at contaminant concentrations greater than 1 ppm for PCB and 2 ppm for carcinogenic PAHs at appropriate licensed facilities; and replacement of excavated material with clean fill to grade.

EPA began demolition and cleanup work under the 2007 ROD in June 2010. Currently all buildings and building debris have been removed. Some crushed concrete has been reused onsite as cover for remaining contaminated soil in the Old Die Cast (ODC) area. Most contaminated soil and sediment has been excavated and disposed offsite. Contaminated soil and sediment areas remain that need to be addressed with a ROD Amendment and ESD. The ROD Amendment will address areas associated with: 1) utilities, including a large-diameter sewer main line and a high-pressure gas line, at the western and northern ends of OU 4; and 2) contaminated soil and PCB DNAPL located in the ODC area. The ESD for OU 4 will address: 1) areas too close to the Eastern Containment Cell for excavation; and 2) contaminated sediment remaining in the North Ditch that, after excavation to the design depth, must be capped due to the impracticality of additional dredging below the water table.

In accordance with the February 2009 ROD, remediation of the TCE DNAPL groundwater plume in OU 4 is complete and will now be monitored. The air sparge curtain has been installed along the southern end of OU 4 and is operating as designed. Injection of sodium permanganate to address one of five remaining TCE groundwater plumes, was performed in spring 2012. Although the ROD identified multiple injections of a soluble substrate such as sodium lactate to treat the five identified TCE plumes, due to the location of one TCE plume in the area of construction of the remaining Sediment Containment Cell, a single injection of an oxidizer (sodium permanganate) was preferred. Because this was a non-significant change to the remedy, a note to file was generated. Further injections at the remaining four TCE plume locations are planned for 2013.

Institutional Controls

Institutional controls (ICs) are non-engineered instruments such as administrative and/or legal controls that can be used to help minimize the potential for human exposure to site contaminants and/or protect the integrity of a cleanup remedy. There are several different types of ICs and sometimes multiple IC types are used or "layered" for extra measures of safety. Governmental controls are ICs issued or promulgated by local municipalities. For example, a city may pass and enforce a local ordinance to prohibit the placement and/or commence the abandonment of private drinking water wells within city limits if a nearby cleanup site had a groundwater contaminant plume emanating beneath the city. The ordinance would be considered an IC in that enforcement of the ordinance by the city would help prevent human exposure to site contaminants in the groundwater.

Other ICs include proprietary controls, which are property-use restrictions issued by property owners; enforcement controls which are site-use agreements contained in a document such as a consent decree; and, informational controls, such as fish-consumption advisories, which are issued to help inform the public of the potential hazards of residual contamination and to provide guidelines for protecting oneself while still using the site.

EPA, as part of a cleanup action, may require placement and compliance with various types of ICs to ensure long-term protectiveness for any site areas which do not allow for UU/UE to residual contaminants.

OU1: Waukegan Harbor

In February 2006 the Illinois Department of Public Health (IDPH) issued a fish consumption advisory update for Illinois waters that included "Waukegan North Harbor of Lake Michigan." EPA considers the IDPH fish consumption advisory to be an informational IC for the OMC site. IDPH recommended that meals of white sucker and sunfish taken from the harbor be limited to one per month due to elevated levels of PCBs in the fish. All other species caught in the harbor should follow the advisory for Lake Michigan fish concerning PCB and methylmercury levels. Currently, carp in Waukegan Harbor are also listed as "do not eat" on the IDPH fish advisory due to PCBs. (*See* IDPH website at www.idph.state.il.us.)

Neither the 1984 ROD nor the 1989 ROD Amendment issued for the cleanup of Waukegan Harbor included the use of ICs as a part of the cleanup remedy for this operable unit. EPA's October 2009 ROD Amendment includes a requirement for ICs and the continued periodic fish monitoring by IEPA to track this risk factor until levels of PCB in fish are below the state advisory level. The ROD Amendment also states that EPA will work with federal, state, and local officials to place ICs, such as deed notices or restrictive covenants on adjacent properties so that the cap that will be placed along the face of the sheet pile walls does not get disturbed by future maintenance dredging or by shipping interests in the harbor.

OU2: Waukegan Coke Plant

The 1999 ROD included ICs as part of the overall RA at the site:

> "Institutional controls, such as deed notices, and groundwater-use prohibitions would be placed on the property to ensure future site uses are compatible with the cleanup action."

In September 2004, EPA issued an ESD establishing the following IC goals:

- No disturbance of the soil cover and soils beneath the cover
- No interference with implementation of site cleanup remedy
- Prohibition of certain future uses including residences, hospitals, schools, and day-care centers

EPA and the owners/responsible parties for OU2 signed a CD in October 2004. The CD outlined the ICs required in order to meet the IC goals outlined in the 2004 ESD. The IC mechanisms included: 1) securing a Declaration of Environmental Easements and Restrictive Covenants, 2) creating an Owners Association Declaration of Covenants, Conditions, Restrictions, and Easements, 3) establishing a city of Waukegan Restricted Groundwater Zone to prevent groundwater use, 4) recording a Notice of Land Use Restrictions and ICs, 5) providing any successor-in-title with written notice of the RA CD, and 6) agreeing to obtain written permission from EPA prior to excavation and/or construction of site projects. All of the listed mechanisms are complete and functioning.

Figure 2 shows the area of extent of OU 2 in relation to where ICs are in place and functioning in accordance with the 2004 CD.

OU 3: PCB Containment Cells

ICs are necessary to protect the integrity of the containment cells and for the remedy to be protective in the long-term. ICs for the existing containment cells area are addressed in the 2005 CD between the city of Waukegan, EPA, and IEPA. The city of Waukegan was required to record a notice to all successors-in-title of the site and the city's obligations under the CD. Additionally, a Declaration of Environmental Easement and Environmental Covenant was filed with the Lake County Recorder's Office. The 2005 CD further states that the city shall refrain from using the site in any manner that would interfere with or adversely affect the implementation, integrity, or protectiveness of the remedial measures and that the city will abide by any additional necessary ICs. Figure 2 shows the area of extent of OU 3 and, in part, where ICs will need to be applied.

Once construction of the final containment cell is completed, an IC work plan will be developed and implemented for all of the cells.

OU4: OMC Plant 2

In September 2007, EPA signed a ROD for building, soil, and sediment remediation at the OMC

Plant 2 site. The ROD called for demolition of the PCB-impacted Plant 2 building and excavation of PCB- and PAH-impacted soil and sediment with off-site disposal of all contaminated materials. Since the selected building and soil cleanup actions in the September 2007 ROD allowed for UU/UE in the targeted areas to be cleaned up, ICs were not planned as a part of the soil and sediment remedy. However, due to difficulties in achieving cleanup objectives of the 2007 ROD in some areas, ICs will be a necessary part of the planned OU 4 ROD Amendment and ESD discussed in Section IV.

Groundwater contaminants in OU 4 that exceed drinking water standards are addressed in the February 2009 ROD. The February 2009 ROD states that ICs may be applied on the property, depending on future use, to prevent exposure to future site residents or factory workers to any residual TCE DNAPL and lists restrictive covenants or municipal ordinances as example ICs. Additionally, the February 2009 ROD states that any new buildings placed on the site would be subject to ICs requiring that foundations be designed to prevent indoor air inhalation risks from site VOCs. Table 2 below summarizes the status of the ICs for the OMC site.

Table 2: Institutional Controls Summary Table

Site areas that do not support unlimited use or unrestricted exposure (current conditions)	**IC Objectives**	**Title of Institutional Control Instrument Implemented or Planned**
OU 1: Waukegan Harbor - Sediment	Place ICs such as deed notices or restrictive covenants on adjacent properties so that the cap adjacent to the sheet pile walls does not get disturbed by future maintenance dredging or by shipping interests in the harbor.	Restrictive covenants or environmental covenants planned.
- Fish	Prevent over-consumption of contaminated fish	State-issued fish consumption advisory. February 2006
OU 2: Waukegan Coke Plant - Soil Note: Although cleanup is completed, the cleanup levels support commercial/industrial	Prohibit incompatible uses.	Restrictive Covenants, Deed Notices, Ordinances, in place and functioning (will be reviewed in the IC Plan) Title: Waukegan Manufactured Gas and Coke

reuse only.		Plant Site Soil Management Plan Recorded date: March 16, 2009
OU 2: Waukegan Coke Plant – Groundwater	Prohibit groundwater use until "drinking water" standards are achieved	Restrictive Covenants, Deed Notices, Ordinances, in place and functioning (will be reviewed in the IC Plan) Title: Waukegan Manufactured Gas and Coke Plant Site Soil Management Plan Recorded data: March 16, 2009
OU 3: PCB Containment Cells - former Boat Slip #3 - East and West Cells -Consolidation Facility	Prohibit incompatible uses to protect integrity of remedy	Additional ICs to be determined once construction is complete.
OU 4: OMC Plant #2 - Soil - Sediment - Groundwater		To be determined in the 2012 ROD Amendment and ESD. To be determined in the 2012 ROD Amendment and ESD. To be determined based on actual future use; may include restrictive covenants and/or municipal ordinances

IC Follow-Up Actions Required

Long-term protectiveness for the site requires compliance with effective ICs. Hence, effective ICs must be implemented, monitored, maintained and enforced along with maintaining site remedy components so that the remedy will function as intended. Long-term protectiveness will be ensured by implementing effective ICs and through LTS of ICs. To that end, an IC Plan will be prepared by EPA to identify the required IC activities and the roles and responsibilities of the parties along with the specific need for an ICIAP or IC work plan to ensure ICs are in place and

effective. The ICIAP may include additional IC evaluation activities, planning for additional ICs implementation or enhancements, as needed, and ensuring long-term stewardship, and will be prepared by EPA, the city, or the PRPs, depending upon the particular OU. Updated maps which depict the current conditions of the site and areas which do not allow UU/UE will be developed as a part of ICIAP or IC Plan. LTS will also be planned for the ICIAP. EPA will produce an IC Plan requiring that an ICIAP (or equivalent IC work plan) be developed in 2013 when the last of the clean up construction work at the OMC site is currently targeted for completion.

Current Compliance

According to inspections and interviews, people are still being exposed to site-related contaminants. Hence, additional work is necessary to restrict these exposures. In the mean time, additional efforts will be considered to ensure that any exposure to site-related contamination is minimized. For example, continuing efforts will be taken to ensure that the fish advisories are effectively preventing exposure to contaminants through fish consumption and that no one is exposed to contaminated groundwater or groundwater vapor that migrate into buildings.

Long-term Stewardship

To ensure long-term protectiveness at the site, effective ICs must be implemented, monitored, maintained, and enforced to ensure that the remedy continues to function as intended. LTS involves assuring effective procedures are in place to properly maintain, monitor, and enforce the ICs along with site O&M. To assure proper maintenance, monitoring, and enforcement of effective ICs, LTS procedures will be reviewed and a plan developed. This plan could be an amendment to an existing O&M plan, a LTS plan, or be included in the ICIAP. The plan should include provisions that the ICs be evaluated regularly. The plan would include regular inspection of ICs at the site and annual certification that ICs are in place and effective. Additionally, use of a communications plan and use of one-call system should be explored to ensure for long-term stewardship of the site.

EPA will produce an IC Plan in 2013 when construction work at the OMC site is complete. The IC Plan will cover all the elements necessary to evaluate the status of ICs for the OMC site at that time.

Operation and Maintenance

OU 1: Waukegan Harbor

The Illinois Department of Natural Resources (IDNR) periodically takes fish samples from the harbor to test them for PCB levels. The IDNR provides the sampling results to EPA as they become available. The caps which will be placed near the harbor seawalls will need to be periodically inspected by EPA and/or the US Army Corps of Engineers.

OU 2: Waukegan Coke Plant

The soils cleanup action was completed by the WCP site PRPs in November 2005. The city of

Waukegan, as the current site owner, is now in charge of maintaining the site fence and mowing the grass on the six to ten-inch soil cover over the site, as per the 2004 CD. Active groundwater cleanup work is complete. The costs incurred by the city for this O&M work are not known, but they are being paid from a trust fund established by the PRPs for O&M under the CD.

OU 3: PCB Containment Cells

Routine O&M of the PCB Containment Cells is performed by the city of Waukegan pursuant to the terms of a 2005 CD between the city, EPA, and IEPA under which the city took title to the abandoned OMC Plant 2 property. Operation and Maintenance consists of maintaining an inward hydraulic gradient in the containment cells, inspecting and repairing the containment cell caps and pumping systems, and monitoring water levels and water quality around the cells. The city maintains an inward hydraulic gradient across the length and width of each PCB containment cell by pumping groundwater from each cell. The pumped water is treated with activated carbon to remove PCBs before it is discharged to the harbor or the North Ditch. The city must also demonstrate the inward gradient by periodically taking water level measurements inside and outside of the cells. The city is required to issue quarterly reports to EPA detailing the O&M actions it undertook at the cells.

The city also routinely inspects and makes timely repairs to the covers of the three containment cells as appropriate. The surfaces of the cell covers consist of top soil overlying a drainage layer and a high density polyethylene synthetic liner. The vegetative cover is inspected each spring. Any gullies or washouts in the topsoil are backfilled, compacted, reseeded and mulched with an appropriate material. Stressed or dead areas of vegetation will be similarly treated. The vegetated areas are mowed at least twice per year and fertilized occasionally.

The city periodically monitors groundwater quality around the containment cells. This requirement consists of detection monitoring, compliance monitoring, and corrective action programs. The detection monitoring program addresses the routine, ongoing monitoring of the containment cell function. Compliance monitoring is implemented if detection monitoring identifies a change that may suggest deterioration in the function of any containment cell. If compliance monitoring determines that contaminants (PCBs) from a containment cell are migrating beyond the slurry walls, then corrective action will be taken. A total of 12 ground water wells were installed after completion of the slurry walls. These wells are analyzed for PCBs quarterly.

OU 4: OMC Plant 2

No O&M tasks are scheduled or underway for the OMC Plant 2 OU because remedial actions are not yet complete in this portion of the site. The air sparge system is, however, scheduled for O&M beginning September 1, 2012. It is anticipated that ICs similar to those planned and in place for OU2 will be developed and implemented.

V. Progress since the Last Review

EPA signed the third Five-Year Review Report for the OMC site on September 26, 2007. The previous five-year review found:

- OU 1 remedy to be not protective because the 50 ppm PCB cleanup level selected in the 1984 ROD for the harbor sediment was too high, leading to high levels of PCBs in harbor-caught fish.
- OU 2 remedy was expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks were being controlled. Long-term protectiveness would require compliance with several types of ICs, as set forth in the 2004 Consent Decree.
- OU 3 remedy was found to be protective of human health and the environment in the short-term but could require ICs in the future to prohibit interference with the containment cells
- OU4 remedy was found to be not protective because there were multiple contaminants in and around OMC Plant 2 that could cause actual or potential exposure to hazardous substances or pollutants.

Since the 2007 Five-Year Review, EPA has performed the following actions at the site OUs.

OU 1: Waukegan Harbor

In October 2009, EPA signed a ROD Amendment for additional sediment clean up. The selected remedy calls for:

• hydraulically dredging sediment from the harbor where the PCB concentrations exceed 1 mg/kg (ppm) and placing a six-inch sand layer on the dredged harbor areas to achieve a 0.2 ppm PCB surface-weighted average concentration (SWAC) in the sediment;

• dewatering the dredged sediment in Geotubes (or an equivalent) and consolidating the dewatered sediment into a containment cell on OU 4;

• filtering recovered water and discharging it by diffusion back into the harbor;

• placing a cap on sediment next to harbor walls that cannot be safely dredged; and

• monitoring PCB levels in harbor-caught fish and sediment to track cleanup progress.

Construction of a sediment treatment building within the former Triax building began in February 2012. Harbor dredging of OU1 per the October 2009 ROD Amendment is scheduled to begin in September 2012. Completion of harbor dredging is scheduled for November 2013. IDNR will continue to monitor harbor fish. Institutional controls will be required to protect areas near the seawalls where a sediment cap will be placed.

OU 2: Waukegan Coke Plant

EPA, with concurrence from IEPA, released an ESD for the site in October 2005 that provided a framework for reuse. The framework prescribed the minimal effort needed to reuse the site according to city zoning, and consisted of a combination of ICs, placing at least three feet of clean soil over the site, and using engineered controls when constructing building foundations in order to manage potential indoor air intrusion hazards. EPA and the U.S. Army Corps of Engineers are currently discussing the use of dredged sediment as additional clean fill at OU2 to reach the three-foot requirement.

Construction of a groundwater treatment plant for OU2 in the existing OU4 Triax Building began in April 2007 and was completed in August 2008. Groundwater cleanup began in late 2008 and was completed in June 2011. The responsible parties for OU2 developed an MNA plan to monitor residual groundwater contamination. EPA approved the plan on March 12, 2012, and installation of the monitoring wells was completed in April 2012.

OU 3: PCB Containment Cells

Since the third Five-Year Review, the city of Waukegan has performed O&M tasks for the PCB Containment Cells. The city has maintained the inward hydraulic gradient in the cells and inspected and repaired the covers on the cells. One additional cell will be constructed to contain the sediment produced during final dredging operations in the harbor during 2012-13. IEPA will be responsible for routine O&M of this new containment cell after one year.

OU 4: OMC Plant 2

EPA issued RODs in September 2007 and February 2009, respectively, for the cleanup of the abandoned buildings, soil, sediment, and groundwater.

All OU 4 buildings, with the exception of the Triax Building, have been demolished and building slabs, soil, and sediment have been remediated. The Triax Building will remain intact to house the treatment system needed for harbor dredging during 2012-13. EPA anticipates that the Triax Building will subsequently be removed by the city of Waukegan, the current owner of the property.

Soil and sediment cleanup is substantially complete, however the remedy will require modifications to address several additional areas of contamination discovered since the 2007 and 2009 RODs were issued. An amendment to the 2009 ROD is being prepared to document modifications which address: 1) residual soil PCB contamination present on the western side of the site in the ODC area below the water table where soil exceeds Toxic Substances Control Act (TSCA) criteria of 50 ppm for PCBs; 2) PCB DNAPL which is present at the base of the aquifer in the ODC area; and 3) soil contamination exceeding ROD clean up levels in a utility corridor that contains a large diameter sewer main and a high-pressure natural gas line, making it unsafe to excavate contaminated soil and transport it offsite for disposal.

As previously discussed, an ESD will be developed in 2012 to modify the 2007 ROD which will

address: 1) areas of soil contamination that are too close to the East Containment Cell to excavate without undermining the integrity of the cell; and 2) sediment contamination remaining below the water table in the drainage ditch north of the site.

Elsewhere, soils above the ROD levels have been excavated and disposed off-site, with the exception of the Trim Building slab, which has been left in place for use as a part of the harbor sediment remediation.

EPA began an on-site groundwater pilot study at OU4 in March 2006, which resulted in an updated FS for groundwater and DNAPL cleanup in August 2008. Subsequently, a ROD was signed in February 2009, which called for:

- utilizing soil mixing technology to inject zero-valent iron (ZVI) and bentonite clay into the TCE DNAPL plume to destroy the plume *in situ*;

- injecting a soluble substrate of sodium lactate, or the equivalent, into five identified VOC-contaminated source areas over multiple years to enhance *in situ* anaerobic bioremediation of the areas;

- installing an air sparge curtain to prevent off-site movement of dissolved chlorinated VOCs in groundwater; and

- applying MNA and ICs post-construction to monitor conditions and protect human health and the environment until final clean up levels are reached.

The air sparge system began operation in September 2011, and will be operated by EPA for one year. At the conclusion of the initial year, IEPA will be responsible for O&M.

Mixing of the ZVI and bentonite in the DNAPL plume area was completed in December 2011. Because one of the five identified VOC source areas is in an area needed for harbor remediation, the *in situ* bioremediation remedy was modified to a single injection of sodium permanganate, as documented in a February 17, 2012, memorandum from the Region 5 Superfund Division Director to the site file. The single chemical oxidation injection was completed in May 2012. The remaining bioremediation injections are planned after evaluation of the sodium permanganate injection and the anticipated new groundwater flow pattern as a result of site building removal.

Finally, a VI Study was conducted at the Larsen Marine Service buildings to confirm that there are no human health risks related to contaminated groundwater vapors from OU4. A report on its results is planned for July 2012.

Table 3 summarizes the issues EPA identified in the third Five-Year Review Report and the actions EPA has taken to mitigate them.

Table 3: Actions Taken Since the Last Five-Year Review

Issues from Previous Review	Recommendations / Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
OU 1: Sediment PCB levels are not protective. Fish are contaminated with PCBs	Perform remedy selection process to determine protective cleanup level and then conduct selected cleanup actions. Maintain fish-consumption advisory.	EPA, in consultation with IEPA Illinois Dept. of Public Health	ROD Amendment: 9/30/08. Milestone date: June 2017	ROD Amendment signed October 2009 for harbor dredging.	Harbor dredging begins: Sept 2012
OU 2: WCP groundwater cleanup has not yet begun; all ICs not in place.	Finish groundwater remedy construction and perform remedy; City and others to issue ICs, EPA to produce IC plan.	PRPs for cleanup City and others for ICs	Groundwater construction: July 2008 IC Plan: January 2010 (EPA)	Groundwater cleanup substantially complete. MNA currently being implemented IC's in place	Active groundwater cleanup completed: Sept. 2011
OU 3: May require ICs for long-term protection.	Make final ICs determination as part of site-wide clean up remedies selected. Produce IC plan.	EPA	IC plan: January 2010.	Final containment cell currently under construction.	
OU 4: EPA has identified risks at OMC Plant 2 site.	Perform selected cleanup actions; consider ICs if necessary.	EPA, in consultation with IEPA.	Funding dependent; estimated to be 2008-10.	Building demolition and sediment cleanup complete. Soil and groundwater cleanup ongoing.	Building and sediment cleanup complete April 2012.

VI. Five-Year Review Process

Administrative Components

EPA began the fourth Five-Year Review at the OMC site in September 2011. The site remedial project manager (RPM), during routine discussions about the various OUs of the OMC site, orally notified the OU2 PRPs, the city, and IEPA of the initiation of the review and encouraged them to comment on the review process. The RPM also sent IEPA a letter on September 6, 2011 to notify IEPA that EPA was starting the fourth Five-Year Review at the OMC site.

Document Review

EPA reviewed several site documents or reports for the various OUs at the OMC site. A complete list of documents reviewed is included as Attachment 1 at the end of this report.

Community Involvement

The EPA RPM orally notified the Waukegan Citizen's Advisory Group (CAG) at an October 2011 monthly meeting that the fourth OMC Five-Year Review was beginning.

EPA also notified the Waukegan community of the start of the fourth Five-Year Review at the OMC site by publishing an advertisement in a newspaper of general circulation. Because there is a large Latino community in Waukegan, EPA placed a second ad, in Spanish, in a newspaper that serves this part of the community. Copies of the advertisements are included as Attachment 2 at the end of this report. In each case EPA invited community members to submit comments to EPA. EPA received no comments concerning the fourth Five-Year Review for the OMC site.

Data Review

New sediment and fish tissue data have been generated for the OMC site OUs since the third Five-Year Review was completed. This new data led to the October 2009 ROD Amendment for sediment cleanup in OU1. Fish tissue concentrations ranged up to 4.5 ppm, with an average of 1.08 ppm, compared to the state's advisory level of 0.05 ppm in fish tissue. Sediment PCB concentrations in Waukegan Harbor range up to 30 ppm and averaged 2.5 ppm. The clean up level for PCB in sediment, calculated in the October 2009 ROD, is 0.2 ppm. Additionally, groundwater data was collected by the PRPs during cleanup of the contaminated groundwater in OU2. EPA's goal for the initial active groundwater clean up phase of OU2 clean up of site COCs was an 80% reduction in contaminant mass. The 80% reduction goal was reached in June 2011. Routine O&M data also continue to be generated by the city of Waukegan for the PCB Containment Cells in OU3.

In OU4, significant amounts of data regarding the contaminated buildings, soil, sediment, and groundwater were generated during OU4 cleanup activities. Most soil areas in OU4 are either substantially remediated to RALs or capped in cases where the contamination was too close to the existing containment cells to excavate. In the ODC Area, however, soil PCB concentrations range up to 11,700 ppm. Additionally, PCB values over 1,000 mg/kg remain in some soil samples taken from the utilities area. Finally, an area east of the Triax Building, referred to as the West Shelf Area, still has soil PCB concentrations up to 650 ppm. This area is scheduled for clean up during summer 2012. The ODC and utilities area will be remediated following issuance of a ROD Amendment and ESD.

Confirmatory sampling results conducted after sediment clean up in OU4 were all below RALs, with the exception of those areas of the North Ditch that have been capped.

OU 1: Waukegan Harbor

The October 2009 ROD Amendment was generated by EPA based on the results of EPA's April 2008, RI Report, an EPA September 2008 memorandum concerning human health risks from PCBs in Waukegan Harbor, and an October 2008 EPA FS Report of OU1.

OU 2: Waukegan Coke Plant

Since the last Five-Year Review, EPA has evaluated groundwater sampling results collected by the PRPs as a part of groundwater remediation at OU2 in order to determine completion of the active groundwater remedy. EPA also reviewed and approved the PRPs work plan for MNA.

OU 3: PCB Containment Cells

Since the last 5-Year Review, EPA has examined the city of Waukegan's quarterly reports for routine O&M of the containment cells. Water level data from monitoring wells confirmed an inward hydraulic gradient was maintained in each of the cells. Water sample analysis data confirmed that no PCBs were discharged from water being pumped and treated to maintain the inward gradients.

OU 4: OMC Plant 2

EPA issued two RODs for remediation of OU4, in August 2007 and February 2009; both RODs were based on the results of the EPA's December 2006 RI/FS Report. The 2007 ROD addressed the remediation of contaminated buildings, soil, and sediment. The 2009 ROD addressed groundwater contamination. EPA generated a Technical Memorandum from its DNAPL investigation at OU4 in March 2007, and completed an enhanced *in situ* bioremediation pilot study in March 2008. Also in March 2008, EPA generated a Data Evaluation Summary Report for OU4. EPA completed a Supplemental FS Report for OU4 in July 2008, and a Supplemental Design Report for portions of OU4 in September 2011.

Site Inspection

EPA conducted a Five-Year Review inspection of the OMC Site on January 27, 2012 with the assistance of IEPA. Representatives of the city of Waukegan and contractors for EPA and the city also participated in the inspection (see Attachment C). The inspection reviewed all of the site OUs and included an inspection of the site monitoring wells, the containment cells and associated pump-and-treat systems, the air sparge system, and the fences and signage.

Based on the OMC site inspection, EPA concluded that monitoring wells, air sparge system, and containment cell pump and treat systems are operating as designed and are well maintained. One monitoring well located at the Slip 3 Containment Cell had been damaged, probably due to ice. The city planned to repair the well in Spring 2012. The city also plans to resurvey the monitoring wells under their control. Concerns were raised by EPA inspectors on the lack of ICs at the site, particularly at the Slip 3 Containment Cell where no fencing is present to prevent

access. OU 2 fencing adequately protects that OU from casual trespassers. EPA and IEPA determined that fencing, gates, and signage at OU 4 are adequate. The city also regularly patrols the site to help prevent casual trespassing. Recent cleanup construction activity at the site also helps keep casual trespassers away. More discussion is needed on the potential for trespassing and the creation of an IC Work Plan for the site.

Interviews

EPA did not formally interview members of the public about the protectiveness of the RAs at the OMC site because cleanup work is still underway. However, EPA RPMs have attended many Waukegan CAG meetings since the last 5-Year review. In addition, the CAG group regularly informs EPA and IEPA about any site issues or concerns it has regarding site management, protection, and public perception.

VII. Technical Assessment

Question A -Is the remedy functioning as intended by the decision documents?

Answer A – **No.**

Work required to implement the RAs outlined in the August 2007 ROD, the February 2009 ROD, and the October 2009 ROD Amendment, is not yet complete. Contaminated building demolition and offsite disposal, as outlined in the August 2007 ROD is substantially complete. However, soil remediation will not meet the requirements of the ROD in some areas, particularly in the Old Die Cast Building area and in the area of utilities. Groundwater remediation in OU4, as outlined in the February 2009 ROD, will require additional years to complete. In addition, DNAPL PCB groundwater contamination located at the ODC Building area will likewise require a modification to the February 2009 ROD. Harbor dredging outlined in the October 2009 ROD has not yet commenced, but is expected to begin September 2012 and be complete by November 2013.

The containment cells are maintained by the city of Waukegan and EPA has noted no outward hydraulic gradients or movement of PCBs from the cells. EPA has identified no need to modify the current performance of OU3 cell O&M.

Equipment replacement rates appeared to be normal. Sufficient resources may need to be directed to the site by EPA, IEPA, or other entities to maintain the effectiveness of the containment cells over the long term, because the city has only agreed to undertake "routine" O&M of the cells. EPA and IEPA will have to assume responsibility for repairing any catastrophic failures of the cells.

The soil cleanup action at OU2 was completed in November 2005. The city now maintains the six-inch clean soil cover that was placed over the site and seeded. Active groundwater remediation is also complete in OU2. The city also maintains the site fence and warning signage to prevent casual trespassing at the site. An MNA plan to monitor residual groundwater

contamination was approved by EPA and installation of the monitoring wells is complete. All ICs have not been implemented at the WCP site.

Question B - Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

Answer B – **No**

Potential Changes in Cleanup Levels

The August 2007 ROD for OU4 called for the excavation of all soil and sediment exceeding 1 mg/kg for PCBs and 2 mg/kg for carcinogenic PAHs followed by offsite disposal. Based on sampling data collected since the August 2007 ROD, certain areas of the OU will not be able to achieve the clean up objectives of the ROD. These areas include the ODC Building area due to soil contamination below the water table which exceeds TSCA levels and groundwater that is contaminated with PCB DNAPL. Additionally, some concrete and associated soil areas situated below the water table at the former Smelter Building, located on the eastern side of Plant 2 area, contains PCB levels exceeding ROD cleanup levels. The area of utilities that include the high pressure gas main and the force main sewer line also cannot be remediated by excavation and off-site removal due to safety concerns. Finally, contaminated soil remains that is too close to the East Containment Cell for excavation and off-site removal. As discussed, these areas will require modifications to the 2007 ROD in the form of an ESD and ROD Amendment.

Table 4 below presents the changes to OMC site cleanup levels to date.

Table 4: Changes in Chemical-Specific Standards

Contaminant	OU	Media	Standard		Citation/Year
Arsenic	OU 2 WCP	Soil	**1999**: 940 ppm	**2004**: 639 ppm	ESD, 2004
Naphthalene			48,556 ppm	2,240 ppm	ESD, 2004
PCBs	OU 1 Harbor	Sediment Fish tissue	**1984**: 50 ppm	**2006**: 0.2 ppm **2009:** 0.05 ppm	October 2009 ROD Amendment

Changes in Exposure Pathways

As previously discussed, the city of Waukegan rezoned the WCP site to high-density residential. Although this change would ordinarily impact exposure assumptions, as residential use implies a UU/UE use assumption for the site, no changes in cleanup standards are needed. This is because EPA's 2004 ESD set forth future residential use conditions at the site, including the future placement of ICs, placement of a three-foot cover of clean soil over the site, and the use of engineered controls in constructing building foundations to prevent potential indoor air intrusion events. The city would be responsible for confirming no unacceptable risks from indoor air

intrusion. The city has agreed to follow these conditions if redevelopment occurs in accordance with its master plan.

Question C - Has any other information come to light that could call into question the protectiveness of the remedy?

Answer C – **No.** No other information has come to light to call into question the protectiveness of the completed remedial actions at the OMC site (except as detailed above in Answers A and B).

Technical Assessment Summary

Site Wide

Long-term stewardship must be ensured at the entire site. Since long-term protectiveness requires implementation of effective ICs that are monitored, maintained, and enforced, an IC Plan will be prepared by EPA to identify the required IC activities and the roles and responsibilities of the parties for each, along with the specific need for an ICIAP or IC work plan at OU2 to be submitted by the PRPs to fulfill their responsibilities to ensure ICs are in place and effective to prevent exposure risk and protect the integrity of the remedy.

OU1: Waukegan Harbor

The 50 ppm cleanup level for PCBs in harbor sediments in the 1984 ROD was not protective because PCB levels found in fish remain above the state advisory level. Therefore, EPA's October 2009 ROD Amendment for the harbor lowered the PCB cleanup level to 0.2 ppm. This cleanup level will be achieved by: 1) dredging contaminated sediment above 1 ppm and applying a sand cover over the dredged areas and 2) applying a cap to contaminated sediment adjacent to the seawall. Based on current harbor sediment PCB concentrations averaging 2-3 ppm and fish PCB levels exceeding consumption advisory levels, EPA determined that additional cleanup of the harbor sediment is necessary for the remedy to be protective of human health and the environment.

OU2: Waukegan Coke Plant

The city of Waukegan rezoned the WCP site to high-density residential from commercial/industrial. EPA issued an ESD in 2004, lowering the cleanup standards for arsenic and naphthalene to support the new use classification of the site.

OU3: PCB Containment Cells

According to data reviewed and the January 2012 Five-Year review site inspection, the PCB Containment Cells are being operated and maintained properly. Thus, the remedy is functioning as intended by the 1984 Waukegan Harbor ROD and 1989 ROD Amendment.

OU4: OMC Plant 2

Demolition of all site buildings and footings, with the exception of the Triax Building, is substantially complete in accordance with the February 2009 ROD. Contaminated soil has been remediated to the 2009 ROD RAOs in most of OU4, with the following exceptions. Soils at the ODC Building area and portions of the Smelter Building below the water table still exceed TSCA PCB standards. Additionally, contaminated soil in proximity to both the East Containment Cell and utilities cannot be excavated due to the potential to jeopardize the existing remedy as well as safety issues. Also, groundwater contaminated with PCB DNAPL has been found in the ODC Building area. EPA will generate a ROD Amendment and ESD to address these areas.

VIII. Issues

Table 5 below, presents the potential protectiveness-affecting issues that the EPA identified during the fourth Five-year Review for the OMC site.

Table 5: Issues

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
OU 1: Initial sediment cleanup levels in Waukegan Harbor were not protective of human health and the environment. Certain species of harbor-caught fish are contaminated with levels of PCBs that are unsafe for human consumption. ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.	Yes	Yes
OU 2: Residual groundwater contamination remains at the Waukegan Coke Plant following completion of soil cleanup and active groundwater remediation. ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with	No	Yes

long-term stewardship.		
OU 3: Complete O&M, including any necessary below-grade remediation, is not in place for long-term protectiveness of the contaminated soil/sediment containment cells. Enforceable ICs are not in place and functioning for long-term protectiveness of the contaminated soil/sediment containment cells.	No	Yes
OU 4: Cleanup of Plant 2 area groundwater contamination is not complete. Confirm no vapor intrusion into the buildings of Larsen Marine Service, a nearby business. ROD Amendment and ESD are needed to complete soil and sediment remedy. ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.	No	Yes

IX. Recommendations and Follow-up Actions

Table 6, below, presents EPA recommendations and follow-up actions for the issues identified in Table 5, above.

Table 6: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
OU 1: Sediment PCB levels are not protective. Fish are contaminated with PCBs.	1A. Complete cleanup pursuant to EPA's October 2009 ROD Amendment.	EPA/IEPA	EPA	Cleanup start: Sept. 2012. Complete Nov. 2013	Yes	Yes
	1B. Maintain existing fish-consumption advisory for the harbor. Re-evaluate during next 5-Year Review.	Illinois Dept of Public Health	EPA/IEPA	June 2017	Yes	Yes
ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.	1C. Develop and implement IC Plan to protect the sediment caps that will be placed adjacent to harbor seawalls along with long-term stewardship, and develop ICIAP	EPA/IEPA	EPA/IEPA	April 2014	No	Yes
OU 2: Residual groundwater contamination remains at the Waukegan Coke Plant following completion of soil cleanup and active groundwater remediation.	2A. Implement MNA groundwater remedy.	PRPs	EPA/IEPA	MNA start: April 2012	No	Yes
ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.	2B. Develop IC Plan and ICIAP	EPA/IEPA/ PRPs	EPA/IEPA	April 2014	No	Yes
OU 3: Complete O&M, including any necessary below-grade remediation, is not in place for long-term protectiveness of the	Once construction of the final containment cell is complete, develop and implement an O&M work plan to	EPA/IEPA	EPA/IEPA	Dec. 2014	No	Yes

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
contaminated soil/sediment containment cells.	protect the integrity of all of the contaminated sediment/soil containment cells.					
Enforceable ICs are not in place and functioning for long-term protectiveness of the contaminated soil/sediment containment cells.	3A. Once construction of the final containment cell is complete, develop and implement an IC work plan to protect the integrity of the contaminated sediment/soil containment cells along with long-term stewardship. Develop ICIAP	EPA/IEPA/ RPPs/City of Waukegan	EPA/IEPA	April 2015	No	Yes
OU 4: Cleanup of Plant 2 area groundwater contamination is not complete.	4A. Complete GW remedy.	EPA/IEPA	EPA/IEPA	August 2016	No	Yes
Confirm no vapor intrusion into the buildings of Larsen Marine Service, a nearby business.	4B. Complete VI Study	EPA/IEPA	EPA/IEPA	July 2012	No	Yes
ROD Amendment and ESD needed to complete soil and sediment remedy	4C. Issue ROD Amendment for ODC Area soils and ESD for East Containment Cell extension, and North Ditch Cap.	EPA/IEPA	EPA/IEPA	ROD Amendment: July 2012 ESD: July 2012		
ICs are needed in areas that do not meet the criteria for unrestricted use or unlimited exposure along with long-term stewardship.	4D. Develop IC Plan and ICIAP	EPA/IEPA/ City of Waukegan	EPA/IEPA	April 2014	No	Yes

X. Protectiveness Statements

OU 1: Waukegan Harbor

EPA has determined that the remedy at OU 1 (Waukegan Harbor) is not protective of human health and the environment in either the short or long term because the sediment clean-up remedy, as identified in the October 2009 ROD Amendment, is not yet complete. Once the PCB cleanup level for harbor sediments has been reached, short-term protectiveness at OU1 will be achieved. Long-term protectiveness at OU1 will be achieved through the following actions: continue implementation of fish-consumption advisory for the northern Waukegan Harbor area until they are no longer necessary, implementation of long-term fish monitoring and development and implementation of effective ICs to protect the sediment cap areas near the seawall.

OU 2: Waukegan Coke Plant

EPA has determined that the remedy at OU 2 (the Waukegan Manufactured Gas and Coke Plant) is protective of human health and the environment in the short term. Soil cleanup is complete and there is no groundwater use. Long-term protectiveness at OU 2 will be achieved by the following actions: implementation of the EPA-approved monitored natural attenuation plan and continued implementation and monitoring of the ICs developed in accordance the 2004 Consent Decree along with long-term stewardship.

OU 3: PCB Containment Cells

EPA has determined that the remedy at OU 3 (the PCB Containment Cells) is protective of human health and the environment in the short term because the existing cells adequately contain the contaminated sediment and soil to prevent human and ecological exposures. Long-term protectiveness at OU 3 will be achieved by the following actions: completion of the final containment cell; an adequate O&M plan to address all potential maintenance issues; and development, implementation, and monitoring of effective ICs.

OU 4: OMC Plant 2

EPA has determined that the remedy at OU 4 (OMC Plant 2) is protective of human health and the environment in the short term. Soil and sediment remediation are complete and there are no drinking water wells that could result in short-term exposures to contaminated groundwater. Site fences provide a barrier to casual site users (trespassers). Long-term protectiveness at OU 4 will be achieved by the following actions: implementation of the 2012 ROD Amendment and Explanation of Significant Differences (ESD) addressing the remaining contaminated soil and groundwater at depth; performance of a VI study to confirm that there are no offsite human health risks from contaminated groundwater vapors; and once the groundwater remedy is complete, the ICs and long-term stewardship procedures will be reviewed to ensure that they are effective.

XI. Next Review

The fifth Five-Year Review for the OMC site is required five years from the signature date of this review.

Attachment A

List of Documents Reviewed

1. Third Five-Year Review Report for OMC site (September 2007)
2. Quarterly O&M Reports for the PCB Containment Cells (2004-2007)
3. Waukegan Coke Plant ROD (September 1999)
4. OMC Plant 2 Remedial Investigation and Feasibility Study Reports (Dec. 2006)
5. OMC Plant 2 ROD (September 2007)
6. Waukegan Coke Plant Remedial Design Documents (2005 and 2006)
7. Waukegan Harbor Remedial Alternatives Array and Data Gaps Report (2003)
8. Waukegan Harbor Risk Evaluation for Development of PCB Cleanup Level (2006)
9. Waukegan Harbor Preliminary Design Document (November 2005)
10. Waukegan Coke Plant ESD (September 2004)
11. Waukegan Coke Plant Remedial Action Oversight Reports (2004-2007)
12. Waukegan Coke Plant Remedial Action Report (Soils) (2006)
13. Waukegan Coke Plant Remedial Action Consent Decree (October 2004)
14. Press Release – Illinois Dept. of Public Health: Sports Fish Consumption Advisory (February 2006)
15. State Comment Letter – OMC Fourth Five-Year Review Report (Appendix A)
16. OMC Plant 2 Site (OU4) Enhanced In Situ Bioremediation Pilot Study (March 2008)
17. OMC Plant 2 (OU4) Data Evaluation Summary Report (March 2008)
18. Supplemental FS Report for the OMC Plant 2 Site (July 2008)
19. OMC Waukegan Harbor Site (OU1) ROD Amendment (October 2009)
20. OMC Plant 2 Site (OU4) ROD (February 2009)

Attachment B

Newspaper Advertisements: Notice of OMC Five-Year Review

Eatery manager pleads guilty to drug charge

BY BETH KRAMER
ekramer@stmedianetwork.com

One of the brothers who manages Jack's Pizza and Burgers accused of operating a drug trafficking ring out of the business took a plea deal Friday.

Elias Papandreou pleaded guilty to Class A misdemeanor unlawful distribution of a controlled substance. He was ordered to pay $4,819 in fines and court costs, and was sentenced to serve 42 days in jail. However, Lake County Circuit Court Judge Daniel Shanes said jail sentence was considered served for the time Papandreou spent in custody.


Elias Papandreou

Papandreou will also have the misdemeanor on his record as a conviction. The felony charges of conspiracy to distribute cocaine were dropped, prosecutor Ken LaRue said.

Papandreou could have spent up to one year in jail and a paid a fine of up to $100,000 for the Class A misdemeanor, Shanes said.

Papandreou was accused of distributing hydrocodone pills (generic Vicodin).

Police allege that about five pounds of cocaine and Vicodin were distributed throughout Lake County from the two Jack's restaurants. The brothers managed the restaurants at 2000 N. Green Bay Road, Waukegan, and 500 Center St., Grayslake.

Papandreou's brother Kostatino "Gus" remains at large and the third brother, Jack, is in federal custody.

Mark Ditka pleads not guilty to DUI


Mark Ditka

BY BETH KRAMER
ekramer@stmedianetwork.com

Another son of former Bears Coach Mike Ditka has pleaded not guilty to DUI charges in Lake County court.

Mark Ditka, 48, pleaded not guilty to DUI in court earlier this week. Unlike his brother Michael Ditka, Mark is not facing a felony DUI.

Mark Ditka of Deerfield was arrested Sept. 24 in his Mercedes-Benz after a Deerfield police officer noticed his vehicle did not have a front license plate. Police reported Mark's eyes were red and bloodshot, his responses slow and words slurred, and his breath smelled of alcohol. His blood-alcohol level test was .16, double the .08 legal limit.

Mark Ditka is due back in court Nov. 16. Michael Ditka was arrested April 20 and charged with his third DUI in Lake County. He also has pleaded not guilty and is due back in court Oct. 27.

EPA Begins Review of Outboard Marine Corp. Superfund Site

Waukegan, Illinois

U.S. Environmental Protection Agency is conducting a five-year review of the Outboard Marine Corp. Superfund site on Seahorse Drive in Waukegan. The Superfund law requires regular checkups where hazardous waste remains managed on site.

EPA selected several cleanup actions for the OMC site including the removal of PCB-contaminated soil and mud (sediment) on both the property and in Waukegan Harbor, construction and maintenance of PCB containment cells, demolition and disposal of factory buildings, and the treatment of contaminated ground water (underground water supplies). This review will consider all information gathered concerning past and future cleanup actions.

More information is available at www.epa.gov/region5/cleanup/outboardmarine and at the Waukegan Public Library, 128 North County St. Inquire at the Reference Desk. The five-year-review will be completed by the end of September, 2012.

This review is an opportunity for you to tell the EPA about site conditions and any concerns you have. Contact:

Kevin Adler
Remedial Project Manager
312-886-7078
adler.kevin@epa.gov

Mike Joyce
Community Involvement Coordinator
312-353-5546
joyce.mike@epa.gov

You may also call the EPA toll-free at 800-621-8431, 8:30 a.m. to 4:30 p.m., weekdays.

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The Sun Publications

La EPA Inicia la Revisión del Sitio Superfund de Outboard Marine Corp.

Waukegan, Illinois

La Agencia para Protección Ambiental de EE.UU está llevando a cabo una revisión de cinco años del Sitio Superfund de Outboard Marine Corp. (OMC, por sus siglas en inglés) ubicado en Seahorse Drive en Waukegan. La ley de Superfund requiere se lleven a cabo revisiones con regularidad en sitios donde se mantienen desechos peligrosos.

La EPA seleccionó varias acciones de limpieza para el sitio OMC que incluyen remover el suelo y sedimento contaminado con PCBs y en la propiedad y en el puerto de Waukegan, construir y mantener recipientes para contener los PCBs, demoler y desmantelar los edificios de las fábricas y tratar el agua subterránea contaminada (suministro de agua potable). Esta revisión tomará en cuenta toda la información recopilada de las acciones de limpieza pasadas y futuras.

Ver www.epa.gov/region5/cleanup/outboardmarine para obtener más información o visite la biblioteca pública de Waukegan (Waukegan Public Library), 128 North County St. Consulte con la sección de referencias. Se terminará esta revisión de cinco años en septiembre del 2012.

Esta revisión le brinda la oportunidad para comunicarse con la EPA sobre las condiciones en el sitio y expresar cualquier duda que tenga. Comuníquese con:

Kevin Adler
Gerente de Proyecto de Remediación
312-886-7078
adler.kevin@epa.gov

Mike Joyce
Coordinador de Participación Comunitaria
312-353-5546
joyce.mike@epa.gov

También puede comunicarse con la EPA al número de teléfono gratuito 800-621-8431 de 8:30 a.m. a 4:30 p.m. durante días laborales.

Attachment C

Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION

Site name: Outboard Marine Corp. Site	**Date of inspection: January 27, 2012**
Location and Region: Waukegan, IL (R5)	**EPA ID: ILD000802827**
Agency, office, or company leading the five-year review: U.S. EPA – Region 5 Tim Drexler, USEPA RPM Sheila Sullivan, USEPA RPM David Linnear, USEPA RPM	**Weather/temperature:** Sunny, 34 degrees

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other (monitoring wells and piezometers)
- ☒ Monitored natural attenuation
- ☒ Groundwater containment
- ☒ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **Site managers**: Tom Hahne (SulTRAC), Project Manager Jewelle Keiser (CH2MHill) Project Manager

   Interviewed on 1/27/12: ☒ at site ☐ at office ☐ by phone
   Problems, suggestions; ☐ Report attached

2. **Site staff:** Keli McKenna, Engineer, CH2MHil date:

   Interviewed on 1/27/12: ☒ at site ☐ at office ☐ by phone
   Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency: IEPA
   Contact: Erin Rednour (Name) | Project Manager (Title) | 01/27/12 (Date) | (517) 373-9832 (Phone no.)

   Agency: City of Waukegan
   Contact : Ron Laubach (Name) | Asst. City Engineer (Title) | 01/27/12 (Date) | (847) 625-6827 (Phone no.)

Agency: City of Waukegan

Contact:	Amy Lynn Strege	Attorney	01/27/12	(847) 331-4327
	Name	Title	Date	Phone no.

Agency: River's Bend Engineering, Inc., Contractor for City of Waukegan

Contact:	Anthony Montemurro	Engineer	01/27/12	(262) 886-3882
	Name	Title	Date	Phone no.

Problems; suggestions; ☐ Report attached

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks: O&M relates to: 1) the City of Waukegan O&M of Slip 3, East, and West Containment Cells, monitoring, and operation of the related extraction and treatment system, and 2) O&M related to the operation and monitoring of the air sparge system.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A
Remarks: HASPs related to O&M plus ongoing remedial efforts in OU4.

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits_____	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks_____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks: Groundwater monitoring is related to: 1) the air sparge system O&M and, 2) the Slip 3, East, and West containment cells.

8. **Leachate Extraction Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks: Lechate extraction is related to Slip 3, and East and West Containment Cells.

9. **Discharge Compliance Records**
☐ Air ☐ Readily available ☐ Up to date ☒ N/A
☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A
Remarks_____

10. **Daily Access/Security Logs** ☒ Readily available ☒ Up to date ☐ N/A
Remarks: Relates to OU4 Area.

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☒ Contractor for PRP and contractor for City of Waukegan
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____

2. **O&M Cost Records (OU 2 Air Sparge System Operation)**
☒ Readily available ☒ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate _____

Total annual cost by year for review period if available

From: Jan 1, 2011 (Date) To: Dec 30, 2011 (Date) $111,000 (Total cost) ☒ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons:

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing -

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
Remarks: Two sides of the Slip 3 containment cell are not fenced—the north side allows access via Larsen Marine and the east side of the cell adjoins the harbor. Public access is available along both sides.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_Signs displayed on air sparge system, on the Plant 2 entrance fence, and a health message sign is located at the beach. All signs are in prominent positions with clear information.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐No ☒ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____

Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached

Remarks:
IC requirements are not yet fully established. Site remediation is ongoing. Once IC requirements are in place, monitoring can be initiated. At this time, there are no ICs in place or planned at the Slip 3 containment cell. A strategy for IC development will be needed for this area.

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
Remarks: ICs are incomplete for the site. Remediation is ongoing.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks_____

2. **Land use changes on site** ☐ N/A
Remarks: Future land use change from industrial to residential is planned by the City of Waukegan. Since remedial work is ongoing, no change to residential use has been implemented yet at the site.

3. **Land use changes off site** ☐ N/A
Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: Existing site roads are predominantly temporary and used for heavy equipment movement to remediation areas. Roads are adequate for this purpose.

Remarks:

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☒ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
   Remarks_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
   Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
   Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
   Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
   ☐ Location shown on site map Areal extent_____
   Size_____
   Remarks_____

6. **Excessive Vegetative Growth** Type_____
   ☐ No evidence of excessive growth
   ☐ Vegetation in channels does not obstruct flow
   ☐ Location shown on site map Areal extent_____
   Remarks_____

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☒ N/A
   Remarks_____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
   Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
   ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☒ Needs Maintenance ☐ N/A

   Remarks: According to the 9/30/11 Quarterly Progress Report by River's Bend Engineering, well W-6 in the Slip 3 Containment Cell has an obstruction that prevents that well from being sampled. In addition, the monitoring wells have not been surveyed since 1998(?) and are due for re-surveying. City plans to survey locations and repair well W-6 during Spring 2012.

4. **Leachate Extraction Wells**
   ☒ Properly secured/locked ☒ Functioning ☐ Routinely sampled ☒ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
   Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks_____

G. Detention/Sedimentation Ponds ☒ Applicable ☐ N/A

Remarks: A retention pond was constructed by OMC, the former property owner of OU 4, for drainage containment. The retention pond is not utilized and will be removed as a part of the remediation effort at OU 4.

1. **Siltation** Areal extent_____ Depth_____ ☒ N/A
☐ Siltation not evident
Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☒ Erosion not evident
Remarks_____

3. **Outlet Works** ☐ Functioning ☒ N/A
Remarks_____

4. **Dam** ☒ Functioning ☐ N/A
Remarks_____

H. Retaining Walls ☒ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☒ Deformation not evident
Horizontal displacement_____ Vertical displacement_____
Rotational displacement_____
Remarks_____

2. **Degradation** ☐ Location shown on site map ☒ Degradation not evident
Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident
Areal extent_____ Depth_____
Remarks: There is heavy evidence of beaver activity (i.e., felled shrubs and small trees, and dams across the water discharge channel northeast of the east containment cell. Onsite personnel indicated that beavers are abundant at the site.

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☒ Vegetation does not impede flow
Areal extent_____ Type_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____
Remarks_____

4. **Discharge Structure** ☐ Functioning ☒ N/A
Remarks_____

VIII. VERTICAL BARRIER WALLS ☒ Applicable ☐ N/A

1. **Settlement** ☐ Location shown on site map ☒ Settlement not evident
Areal extent_____ Depth_____
Remarks_____

2. **Performance Monitoring** Type of monitoring_____
☐ Performance not monitored
Frequency_____ ☐ Evidence of breaching
Head differential_____
Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Air Sparge System, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Air Sparge Pumps, Wellhead Plumbing, and Electrical**
☒ Good condition ☒ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance ☒ N/A
Remarks_____

3. **Spare Parts and Equipment**
☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☒ Carbon adsorbers
   ☒ Filters Bag filters replaced by filter canisters several years ago
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   Others___
   ☒ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   Equipment properly identified
   ☒ Quantity of groundwater treated annually Each of the three containment cell treatment systems process 10 gpm
   ☐ Quantity of surface water treated annually_____
   Remarks: Treated groundwater is discharged to Waukegan harbor.

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☒ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   ☒ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
   ☒ Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
   ☒ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____

D. Monitoring Data

1. **Monitoring Data**
   ☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring data suggests:**
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☒ N/A

Remarks: MNA for OU2 is to begin implementation during Spring 2012. MNA for OU4 is planned at the conclusion of DNAPL remediation and *in situ* bioremediation program to begin Spring 2012.

X. OTHER REMEDIES

See Attached table of monitoring well condition.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy for the OMC Site consists of: 1) excavation and onsite disposal of contaminated sediment from OU1, 2) MNA for OU2, 3) the addition of a containment cell between the east and west cells of OU3 for the OU1 sediment, and 4) a combination of soil and sediment excavation and offsite disposal, capping, and containment in the OU4 area. Only portions of the total planned Remedial Actions are complete. The Air Sparge System in OU4 is operating effectively and as designed. Completion of contaminated soil and sediment in the OU4 area is ongoing. Treatment of the DNAPL plume in OU4 is complete. Treatment of the larger groundwater plume area in OU4 is planned to begin Spring 2012. Removal of contaminated sediment in OU1 is planned for Summer 2012. Implementation of the MNA remedy for OU2 is scheduled to begin during late Spring 2012.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The Remedy is not complete. Only very preliminary O&M is being conducted at the site.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

There are no issues at this time.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None identified at this time.

Appendix A

State Comment Letter

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397

PAT QUINN, GOVERNOR **JOHN J. KIM**, INTERIM DIRECTOR

June 4, 2012

Mr. Timothy Drexler
Remedial Project Manager, Superfund Division
United States Environmental Protection Agency
Region V – Mail Code SR-6J
77 W. Jackson Boulevard
Chicago, Illinois 60604-3590

RE: 0971900017 – Lake County
Outboard Marine Corporation National Priorities List Site
Waukegan, Illinois
Superfund/Technical Reports
Five Year Review Site Inspection
Five Year Review Report

Dear Mr. Drexler:

The Illinois Environmental Protection Agency ("Illinois EPA") participated in the Five Year Review Site Inspection conducted Friday, January 27, 2012 and has reviewed the draft Five Year Review Report. Illinois EPA concurs with the findings of the report. Specifically, the Illinois EPA also notes that the Outboard Marine Corporation (OMC) Site is not protective of human health or the environment in a combination of both short and/or long term as follows:

OU 1 (Waukegan Harbor) Remedial Action is not protective of human health and the environment in either the short or long term because the sediment clean-up remedy, as identified in the October 2009 ROD Amendment, is not yet complete. Once the PCB cleanup level for harbor sediments has been reached, short-term protectiveness at OU1 will be achieved. Long-term protectiveness at OU1 will be achieved through the follow actions: continued implementation of fish-consumption advisory for the northern Waukegan Harbor area, implementation of long-term fish monitoring, and development and implementation of effective institutional controls (ICs) to protect the sediment cap areas near the seawall.

OU 2 (the Waukegan Manufactured Gas and Coke Plant) Remedial Action is protective of human health and the environment in the short term. Soil cleanup is complete and there is no groundwater use.

Long-term protectiveness at OU 2 will be achieved by the following actions: implementation of monitored natural attenuation plan and monitoring of ICs developed in accordance the 2004 Consent Decree along with long-term stewardship.

OU 3 (the PCB Containment Cells) Remedial Action is protective of human health and the environment in the short term because the existing cells adequately contain the contaminated sediment and soil to prevent human and ecological exposures. Long-term protectiveness at OU 3 will be achieved by the following actions: completion of the final containment cell; an adequate O&M plan to address all potential maintenance issues; and development, implementation, and monitoring of effective ICs.

OU 4 (OMC Plant #2) Remedial Action is protective of human health and the environment in the short term because there are no drinking water wells that could result in short-term exposures to contaminated groundwater and site fences provide a barrier to casual site users (trespassers). Long-term protectiveness at OU 4 will be achieved by implementation of the 2012 ROD Amendment and Explanation of Significant Differences (ESD) addressing the remaining contaminated soil and groundwater at depth; performance of a VI study to confirm that there are no offsite human health risks from contaminated groundwater vapors, and once the groundwater remedy is complete, implementation of adequate ICs and long-term stewardship procedures.

Thank you for your continued commitment and coordination with Illinois EPA and other stakeholders to negotiate the details of additional necessary remedial action.

If you have any questions regarding this matter, please contact me at (217) 785-8725.

Sincerely,

Erin J. Rednour

Erin J. Rednour, Remedial Project Manager, Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276